

BEFORE THE CANTERBURY REGIONAL COUNCIL

IN THE MATTER OF

The Resource Management Act 1991

AND

IN THE MATTER OF

an application by **Southdown Holdings Limited** for a water permit filed under **CRC040835** to take and use surface-water from Lake Ohau for spray irrigation of up to 2,068 hectares for crops and pasture for grazing stock, including milking dairy cows, at Glen Eyrie Downs.

**REPORT AND DECISION OF HEARING COMMISSIONERS PAUL ROGERS,
MICHAEL BOWDEN, DR JAMES COOKE AND EDWARD ELLISON**

PART B - SITE SPECIFIC DECISION

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1 INTRODUCTION

- 1.1 This is a decision on an application by **Southdown Holdings Limited** (the applicant). It is one of many decisions we have made on 104 applications by various applicants for water permits and associated consents in the Upper Waitaki Catchment.
- 1.2 The decision should be read in combination with our Part A decision, which sets out our findings and approach to various catchment wide issues that are common to multiple applications. References to our Part A decision are made throughout this decision as appropriate.

1 THE PROPOSAL

- 1.1 The applicant's proposes to take and use water from Lake Ohau to irrigate an area of 2,068 ha on Glen Eyrie Downs (refer Figure 1 for proposed area of irrigation). The water will also be used to provide water for stock and domestic supply. This was confirmed by the evidence of John Kyle, which we will refer to later.
- 1.2 The proposed rates and volumes of water are a maximum rate not exceeding 1,200 litres per second, and a volume not exceeding 103,680 cubic metres per day, and 12,408,000 cubic metres per year.
- 1.3 Water will be conveyed from the point of take (Lake Ohau) through a pipe system. The proposed intake pipe will follow the approximate alignment shown in Figure 1. The intake structure will consist of two 85 meter galleries located perpendicular to the shoreline, details of which are provided in Decision CRC040836. The abstracted water will be used for irrigation of pasture using a combination of spray systems, but predominantly centre pivots.

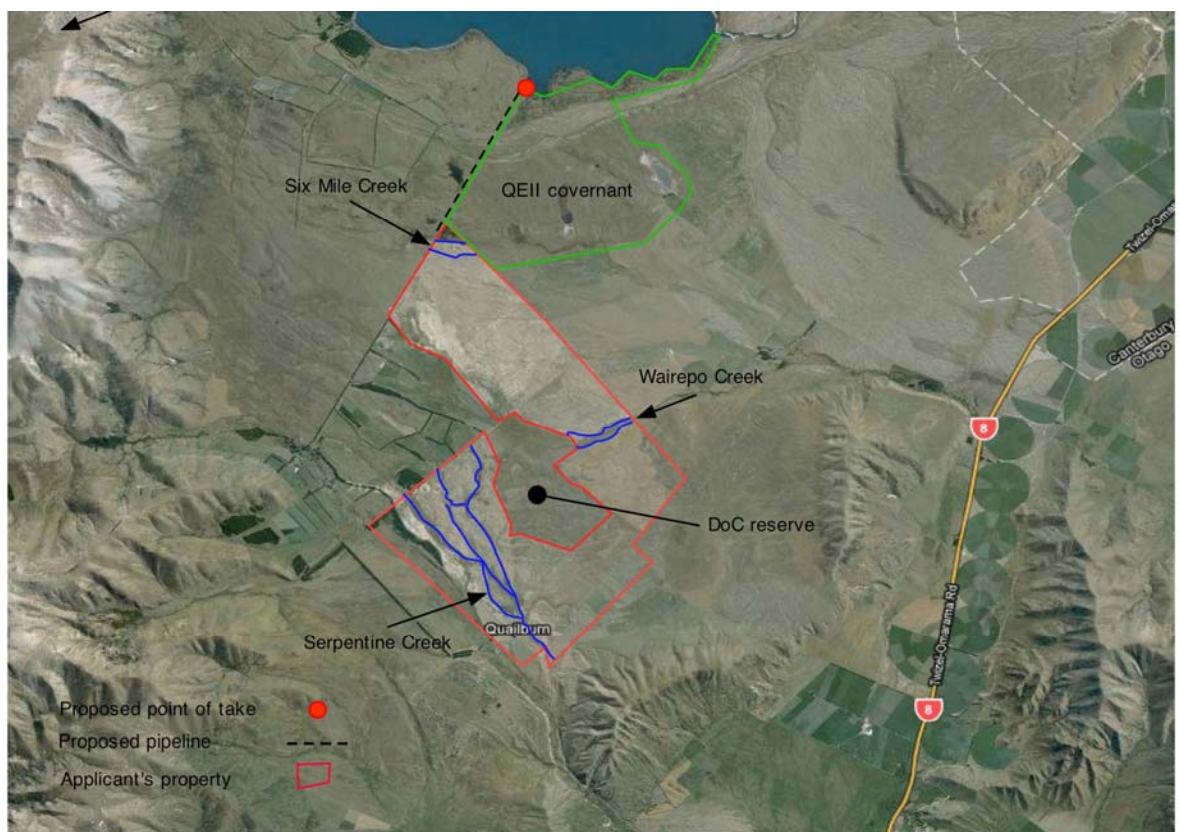


Figure 1. An aerial photo of the applicant's property illustrating rivers and creeks within the boundary, surrounding hills, lakes and existing irrigation. This figure is intended as a visual guide. The application and applicant's evidence was used to determine actual locations. Note the proposed irrigated area is all that land within the applicant's property (red lines) less buffer zones adjacent to streams as discussed in evidence.

- 1.4 The applicant is proposing an intensive dairy cow operation on the property. This proposal includes creating six separate dairy systems each consisting of up to 1,205 cows with the cows being housed in cubicle barns for up to eight months of the year. During this time the effluent will be collected, separated into solids and liquids and stored in large effluent ponds. When favourable soil conditions allow (summer time) the applicant is proposing to spray the liquid effluent on the pasture using the proposed centre pivot irrigation system. The collected solids will also be stored and spread over the pasture at appropriate times.
- 1.5 The applicant is proposing a number of mitigation methods including: being subject to the minimum lake level for Lake Ohau as set out in the WCWARP; metering the take with an appropriate meter, and development of a Farm Environmental Management Plan (FEMP) to address water quality issues. These issues are addressed in evidence.

The application

- 1.6 The application is for a water permit to take and use surface water pursuant to section 14 of the RMA. Consent is required under the Waitaki Catchment Water Allocation Regional Plan, as discussed below.
- 1.7 The application (CRC040835) was lodged with the Canterbury Regional Council (the Council) on 24 October 2003. This application was publicly notified and there were a number of submissions that are referred to later in this decision.
- 1.8 The application is for a new activity and requested a term to expire on 30 April 2025. This expiry date was a condition of Meridian Energy Limited's (MEL) derogation approval and coincides with the expiry of MEL's Waitaki Hydro-power scheme consents.

Modifications after notification

- 1.9 When originally notified, the application included an irrigation area of 400 hectares on either the neighbouring Ohau Downs or Shelton Downs properties in addition to the 2,100 hectares on Glen Eyrie Downs. The total proposed take from Lake Ohau for the irrigation of 2,500 ha was 15,000,000 cubic metres per year.
- 1.10 On 30 July 2009, the applicant advised the Council that the option for irrigation on Shelton Downs was to be put "on hold" until the outcome of the Waitaki District Plan change process in relation to landscape has been completed. Subsequent to this, as stated in the applicant's evidence presented at the hearing, the applicant has advised it no longer wishes to pursue the part of this application that relates to taking and using water on either Ohau Downs or Shelton Downs.
- 1.11 Consequently the application was amended to take and use up to 12,408,000 cubic metres per year for the irrigation of 2,068 ha of land on Glen Eyrie Downs only. It is also noted that the proposed irrigation area on Glen Eyrie Downs has been reduced from 2,100 ha to 2,068 ha as a result of the Mackenzie Irrigation Company (MIC) shares the applicant has acquired. No change to the proposed instantaneous rate of take (1,200 l/s) has been made.
- 1.12 The general principle for modifications after notification is that amendments are allowed provided they do not increase the scale or intensity of the activity or significantly alter the character or effects of the proposal. The key consideration is prejudice to other parties by allowing the change. In this case, we are satisfied that the above changes do not significantly alter the intensity or effects of the proposal and that no party would be adversely affected by allowing the changes.

Additional consent applications

- 1.13 An application was submitted by the applicant, on 27 July 2009, which seeks consent for the use of land for a stock holding pad, use of land to store animal effluent and the discharge of solid and liquid effluent onto the applicant's property (Glen Eyrie Downs).
- 1.14 These applications were 'called-in' by the Minister for the Environment on 27 January 2010. Subsequent to this call-in the applicant withdrew these applications. We discuss the implications of the call-in and the applicant's subsequent withdrawal of the effluent applications in Part A of this decision.
- 1.15 In addition, there is a separate application for land use consent to disturb the bed and banks of Lake Ohau and Maori Creek for the purpose of constructing and maintaining a pump station,

intake and pipeline (CRC040836). This infrastructure will be used to extract and convey the water that is the subject of the current application. Our decision on the land use consent application is contained in a separate decision.

2 DESCRIPTION OF THE ENVIRONMENT

- 2.1 The following description of the environment was provided in the S42A Officer's Report (Report 35A) and is intended to provide a brief overview of the environmental setting. Further description of the environment including the relevant watercourses, and current land use is covered in our discussion of the applicant's evidence.
- 2.2 Lake Ohau is a natural glacier feed lake with its main inflow from the Dobson and Hopkins Rivers. The lakes outflow has been modified since the construction of the hydro-electric scheme. Its natural out flow (Ohau River) now only receives a flow of between 8-12 m³, with the majority of the flow being diverted into the Ohau B canal to Lake Ruataniwha. Unlike Lakes Tekapo and Pukaki, Lake Ohau's water level was not artificially raised as part of the hydro development. However, MEL who own and operate the hydro scheme now controls the lake levels.
- 2.3 Three water courses flow through the proposed irrigation area being Six Mile Creek, Wairepo Creek and Serpentine Creek (refer Figure 1 for locations). In addition, Maori Stream flows in a north-easterly direction through Ohau Downs towards Lake Ohau and will be crossed by the applicant's proposed pipeline. As mentioned above, the applicant has applied for consent to under take this proposed stream crossing (Land Use Consent Application CRC040836).
- 2.4 Sections of streams and their tributaries that run through the property are identified as being Recommended Areas of Protection (RAPs) and Sites of National Significance. A wetland area in the eastern corner of the irrigation area is a WERI and SSWI ¹site. There is a 405 ha Department of Conservation Reserve (DoC Reserve) in the centre of the property that was protected after land was converted from leasehold to freehold. This reserve is known as the Wairepo Kettleholes Conservation Area and provides for, among others, protection of black stilt habitat.
- 2.5 According to the S42A report the applicant's property is noted for a vigorous red tussock community and a moraine-dammed swamp. There are tarns and streams which support waders and waterfowl. The ephemeral wetland area has very high numbers of waterfowl and waders when water is present.
- 2.6 In the S42A officers report stated that the applicant's property is currently used for low intensity sheep and cattle farming. We note that this is incorrect and that the applicant advises that the property is currently used for biofuel (mainly canola) cropping. We also note that between September 2007 and February 2009 the applicant removed 1,200 ha of wilding pines from the property.
- 2.7 In relation to our site visit, we detailed our site visits in Part A and we do not repeat this information here. Whilst we viewed Glen Eyrie Downs from the air (helicopter trip) and the road, we did not go on to the property.

3 PLANNING INSTRUMENTS

- 3.1 As discussed in our Part A decision, there is a wide range of planning instruments that are relevant under the RMA. This includes national and regional policy documents, along with regional and district plans. The key planning instruments relevant to this application are as follows:
 - (a) Waitaki Catchment Water Allocation Plan (WCWARP);
 - (b) Natural Resources Regional Plan (NRRP);
 - (c) Proposed and Operate Canterbury Regional Policy Statement (CRPS); and
 - (d) Waitaki District Plan (WDP)
- 3.2 The provisions of these planning instruments critically inform our overall assessment of the application under s104(1)(b) of the RMA, as discussed in Section 14 of this decision. In addition,

¹ These stand for Wetland of Regional Importance and Site of Special Wildlife Importance, being classifications developed by the Department of Conservation as indicators of areas with some significant ecological value.

the rules within the relevant planning instruments determine the status of the activity, as set out below.

Status of the activity

- 3.3 In our Part A decision we provide a detailed discussion of our approach to determining the status of activities. We now apply that approach to the current application.
- 3.4 This application is listed in Schedule 2 of the Resource Management (Waitaki Catchment) Amendment Act 2004. Section 88A therefore does not apply and the relevant plan for this activity is the operative WCWARP.
- 3.5 The following rules from the WCWARP are applicable to this application:
- (a) Rule 3, clause (1) – The applicant proposes complying with the minimum lake level of 519.45 metres above sea level in Lake Ohau.
 - (b) Rule 6 – The activity is within the allocation limit of 275 million cubic metres for agricultural activities upstream of Waitaki Dam. However, it exceeds the allocation limit of 12 million cubic metres of water for the catchment above the Lake Ohau outlet.
 - (c) Rule 18 - Classifying rule – non-complying activity
- 3.6 Overall, the proposal is a **non-complying activity** under Rule 18 of the WCWARP and resource consent is required in accordance with section 14 of the RMA.

4 NOTIFICATION AND SUBMISSIONS

- 4.1 The application was publicly notified on 4 August 2007 and 22 submissions in total were received, including:
- (a) 3 in support;
 - (b) 17 in opposition; and
 - (c) 2 neither in support nor opposition.
- 4.2 Table 2 is based on the relevant s42A reports and summarises those submissions that directly referenced the application. In addition to those listed, there were other submitters that presented evidence at the hearing that was relevant to this application. The relevant evidence from submitters is discussed in more detail later in this decision. Please note that all submissions hold equal importance, even if not specifically listed below.
- 4.3 Overall, the key effects of concern to submitters include ecosystems, water quality, allocations limits, minimum flows, natural character and landscape, efficiency and cultural values

Table 2. Submissions made on application CRC040835

Submitter	Reasons	Position
Ohau Snow Holdings Limited	Irreversible degradation of water quality	Oppose
Canterbury Aoraki Conservation	Proposed activities do not promote sustainable management of natural and physical resources.	Oppose
Fish & Game Council of New Zealand	Concerned with effects of proposals on sport fish and game bird species	Oppose
TJ & J Cooke	To enable fertile land to become more productive. This area of land would otherwise be covered in wilding pines.	Support
Blue Family Trust	Loss of amenity values on shores of Lake Ohau as submitter an	Oppose

	immediate neighbour. Visual and noise effects from proposal.	
Dr Molloy (QEII Trust)	Concern about effects of pipeline and irrigation on protected QEII Covenant area	Oppose
Meridian Energy Limited (MEL)	Potential low flow levels that would occur as a result of the maintenance, works, or upgrade to existing infrastructure. Also concerned about water quality, metering, and reasonable use	Oppose

5 THE SECTION 42A REPORTS

- 5.1 A comprehensive officer report on the application and submissions was prepared by the Regional Council's Consents Investigating Officer (Ms Claire Penman). The report was supported by specialist reports prepared by:
- (a) Mr Christopher Glasson - Landscape Effects
 - (b) Dr Adrian Meredith - Surface water quality
 - (c) Mr Darren McNae - OVERSEER audit
 - (d) Dr Michael Freeman - Overview Report (Water Quality and Landscape)
 - (e) Ms Maria Bartlett - Existing and proposed annual allocation
- 5.2 The report was pre-circulated in advance of the hearing. Specific points noted from the s42A report are summarised below. Any comments or recommendations from the additional Section 42A Officer's Reports, listed above, have been specifically referenced.

Other Water Users

- 5.3 Ms Penman noted that there are no existing consented users from Lake Ohau that are restricted by minimum lake levels. However, she added that there is one applicant seeking a replacement consent with lower priority.
- 5.4 Ms Penman noted that there is not an instantaneous allocation limit for Lake Ohau, however, the total annual allocation under the proposed application exceeds that available for agricultural and horticultural activities upstream of Lake Ohau outlet of 12 million cubic metres per year. In her S42A report Ms Penman noted that the applicant has not assessed the effects of any reduction in water available for other activities as required under Policy 12 of the WCWARP. She therefore could not conclude that effects on other water users are minor.

Water Quality

- 5.5 In terms of effects at the local scale, Ms Penman noted that the applicant had considered the impacts of the proposed use of water for irrigation on groundwater and surface water quality. At the time of writing her S42A Report, Ms Penman noted that the applicant had not provided any details of the mitigation measures or an assessment on water quality once the measures set out in the FEMP are implemented.
- 5.6 Ms Penman noted that several water bodies run through the proposed irrigation area: Wairepo Creek, Six Mile Creek and Serpentine Creek. She acknowledged that the applicant proposed to fence a minimum of a 5 metre buffer strip along their length to prevent stock access.
- 5.7 As a full mitigation suite and assessment of residual effects on water quality had not yet been provided, Ms Penman was not satisfied that the adverse effects on water quality from the proposed activity will be minor.

Cumulative effects

- 5.8 Ms Penman noted that an assessment of cumulative effects on water quality was requested by the Council to address the above concerns and in reference to Policy 13 of the WCWARP. She acknowledged that the applicant has been involved with the study by Mackenzie Water Research Ltd (MWRL) on cumulative effects within the catchment.

- 5.9 Given the significant level of uncertainties involved in, and technical concerns with, critical aspects of the MWRL/GHD assessment of the adverse effects, together with the lack of mitigation measures yet proposed by the applicant Ms Penman was unable to make conclusions in her S42A Report about the potential adverse cumulative effects.

Terrestrial effects

- 5.10 Ms Penman noted that the applicant did not consider that irrigation of the area surrounding the DoC Reserve will affect the terrestrial ecological communities in that reserve. She noted that there were outstanding submissions regarding effects on terrestrial ecological values that have not been addressed by the applicant. These areas of concern include the DoC Reserve and QEII covenant that are recognised on the Council's database as containing areas of WERI, SSWI and Sites of National Significance.
- 5.11 Because of the above, Ms Penman could not conclude that effects on terrestrial ecosystems will be less than minor. At the time of writing her report Ms Penman recommended that an assessment and mitigation measures are provided by the applicant.

Landscape Effects

- 5.12 Ms Penman noted that the irrigation site is in a high amenity area on the lake edge, adjacent to a QEII covenant area and is visible to general traffic travelling to Ohau Village and users of the Ohau Lake.
- 5.13 Ms Penman reviewed the Waitaki District Plan and noted that none of the land area subject to this application is designated as Outstanding Natural Landscape through Proposed Variation 2 to the Waitaki District Plan.
- 5.14 Mr Chris Glasson had concluded in his S42A Report that the effects on landscape from this proposal were likely to be significant. This is based on a number of factors including:
- (a) the close proximity of the site to Quailburn Road;
 - (b) the proposed irrigated land within the Outstanding Landscape Area (OLA) and adjacent to streams and wetlands; and
 - (c) the lack of information as to whether the whole area will be irrigated in a continuous manner; the lack of integration with landform patterns which would be visible from Quailburn Road.
- 5.15 However, Mr Glasson considered that if mitigation measures were proposed such as: removing the irrigation area from the OLA; creating riparian buffers of natural vegetation to streams and water bodies; retaining the hillocks and downlands in their natural state; integrating the irrigated area into landform patterns; and having a 300m buffer back from the Quailburn Road then the adverse effects could be reduced to a moderate level.

Recreational and amenity values

- 5.16 The appropriate minimum lake level, as set in the WCWARP, has been adopted by the applicant which Ms Penman considered would provide for protection of recreational and amenity values on Lake Ohau
- 5.17 In terms of benefits Ms Penman noted that the use of water for irrigation may result in improved productivity of the land and positive economic benefits for the wider community.

Ecosystems

- 5.18 Ms Penman noted that the minimum lake level as set out in the WCWARP takes into consideration the protection of ecosystems. She added that if a fish screen is installed which is in accordance with recommended conditions, then effects would be minor.

Efficient and Reasonable Use

- 5.19 The taking of water in excess of that required for the intended use may contribute to water levels being unnecessarily reduced and less water available for other users according to Ms Penman. She also noted that a number of submitters have identified this issue.

- 5.20 In the original application, which Ms Penman based her assessment on, the applicant proposed to take water at a rate not exceeding 1,200 litres per second, and use up to 14,808,000 cubic metres of water per year for irrigation of 2,468 ha. Ms Penman noted that the irrigation volume had been determined by the applicant using the volume adopted by MIC of 600 millimetres per hectare per year.
- 5.21 As a comparison to the applicant's annual volume calculation, Ms Penman used the Council's GIS system and the method outlined in Report U05/15 to determine an appropriate annual volume for spray irrigation of the proposed area on both Glen Eyrie Downs and Ohau Downs in accordance with Policy 16(c)(ii).
- 5.22 Ms Penman noted that the soil PAW values she had used came from Mr Trevor Webb of Landcare Research, which suggested some of the soils in the area are lighter than the applicant has advised.
- 5.23 Ms Penman calculated that an annual volume of 12,451,500 cubic metres would be considered an efficient volume of water for spray irrigation of this area. We note that Ms Penman's calculations are based on the applicant irrigating 2,400 ha which included a 400 ha block of Ohau Downs. As the application has been amended to just the 2,068 ha on Glen Eyrie Downs, the volume calculated by Ms Penman is no longer comparable to the annual volume requested by the applicants, which is now 12,408,000 m³/y.
- 5.24 Despite this discrepancy we note that Ms Penman was not satisfied that the original annual volume being sought by the applicant (14,808,000 cubic metres per year) would be reasonable and appropriate for the area and method of irrigation proposed.
- 5.25 Ms Penman also considered that the standard efficiency condition is appropriate to ensure that water is not applied to the soils above their average water holding capacity, nor onto unproductive areas of land.

Cultural

- 5.26 According to Ms Penman, the applicant had not provided an assessment of the effects of the proposed activity on cultural values at the time of writing her S42A Report. She added that submissions were received in opposition to this application from Te Runanga o Ngai Tahu. Te Runanga o Ngai Tahu raised concerns relating to mixing of waters between catchments, deterioration of water quality, dewatering and residual flows, changes to sediment flow and deposition and impacts on sites of cultural significance. Ms Penman also added that Lake Ohau has a statutory acknowledgement area in the Ngai Tahu Claims Settlement Act 1998.

Statutory Assessment

- 5.27 We note that Ms Penman's statutory assessment provided in her S42A Report was compiled prior to her reading the applicant's or submitters' evidence. Consequently, some of the statutory issues raised by Ms Penman may have been addressed during the course of the hearing.
- 5.28 With regard to s104(1)(b), Ms Penman considered the relevant provisions of the RPS and WCWARP. She did not consider the water permit application is consistent with:
- (a) Policy 13 due to there being likely effects on water quality and there is a lack of mitigation proposed by the applicant;
 - (b) Policy 12 as it was over the allocation limit in this catchment, and,
 - (c) Policies 15 and 16 due to effects of inefficient use.
- 5.29 In addition, Ms Penman could not make a conclusion about whether the application is consistent with Objective 1 given the number of submissions to be heard.
- 5.30 In regards to Part II of the RMA Ms Penman noted that the proposal would allow the development of land to occur, which may provide for the economic and social well-being of the community. The applicant however had not proposed measures to "safeguard the life-supporting capacity of water" and "avoid, remedy or mitigate" the potential impacts on surface water quality and landscape values as required in Section 5(2)(c), or provided information to confirm that the proposed annual volumes requested are reasonable and consistent with the objectives of Section 5(2)(a), which aims to provide for the needs of future generations.

Section 6

- 5.31 Ms Penman noted that the proposal will include a change in visual aesthetics in an area of high amenity value and may result in effects on water quality and ecosystems that have not been adequately mitigated. She added that the applicant has not yet proposed measures to address these effects. The applicant had not assessed the impacts on cultural values, and runanga have submitted in opposition on this application.

Section 7

- 5.32 Ms Penman stated that sub-sections (b), (c) and (f) are specifically relevant to this application and should be considered when deciding the acceptability of effects according to Ms Penman. Section (b) relates to the efficient use of water and according to Ms Penman there is currently insufficient conclusive evidence to confirm that the applicant's requested annual volume is reasonable.
- 5.33 Section (c) refers to the maintenance and enhancement of amenity values. The applicant had not proposed mitigation measures to ensure that this objective is achieved according to Ms Penman. However, she added that maintaining buffer distances between the irrigation area and areas used by the public, such as roads and conservation areas, may ensure that the amenity values of the area are not compromised.
- 5.34 Section (f) refers to the maintenance and enhancement of the quality of the environment. Ms Penman noted that the applicant had not proposed mitigation measures to ensure that this objective is achieved, particularly with regards to water quality.

Section 8

- 5.35 Section 8 of the RMA requires the consent authority to take into account the principles of the Treaty of Waitangi. Ms Penman noted that the site lies within the rohe of Waihao, Moeraki and Arowhenua Runanga. She added that submissions have been received from Ngai Tahu and runanga on these applications.

6 THE APPLICANT'S CASE

- 6.1 Legal counsel for the applicant, Mr Christian Whata, presented opening submissions and called 11 witnesses as follows:
- (a) John McIndoe (Aqualinc Research Limited) – Proposed activity, efficient and reasonable use
 - (b) Richard Peacocke (Southdown Holdings Limited) – owners submission
 - (c) John Kyle (Mitchell Partnerships Limited) – Planning issues
 - (d) Stephen Brown (Stephen Brown Environments) - Landscape
 - (e) Dr John Bright (Aqualinc Research Limited) –Groundwater, node monitoring, cumulative effects
 - (f) Robert Engelbrecht (Bob Engelbrecht Consultancy Limited) – Farm management
 - (g) Buddy Mikaere (Buddy Mikaere and Associates) - Cultural
 - (h) Dr Ruth Bartlett (Mitchell Partnerships Limited) – Terrestrial ecology
 - (i) Dr Melissa Robson (Ryder Consulting Limited) – Farm Environmental Management Plan
 - (j) David (Neal) Borrie (Aqualinc Research Limited) – Cubicle Barn – waste disposal
 - (k) Dr Gregory Ryder (Ryder Consulting Limited) – Aquatic ecosystems
- 6.2 We note that the majority of the applicant's expert evidence was presented in conjunction with, one or more, of the following applicants: Five Rivers Limited, Killermont Station Limited and the applicant's proposed irrigation on the Killermont property. In this Decision the evidence

presented in The Applicant's Case and The Applicants Right of Reply only includes information relevant to the applicant's property.

- 6.3 It should also be noted that where the evidence has referred to multiple properties, which includes the applicants, we have used that information in the context of applying to the applicant's property only. The original evidence should be referred to determine any other property that this information may relate to.

Opening legal submissions

- 6.4 The applicant, together with Five Rivers Ltd, Williamson Holdings Ltd and Killermont Station Ltd, was represented by Mr Christian Whata . Mr Whata also represented McKenzie Water Research Ltd, who presented the cumulative effects assessment on behalf of all applicants seeking consents at this hearing.
- 6.5 Mr Whata opened his evidence by stating that the applicant is committed to best practice and that their farm management proposals are cutting edge. He added that the applicant fully appreciates the need to avoid adverse effects. Importantly, best practice combines with high productivity to make the farm viable.
- 6.6 Mr Whata acknowledged that the application covers relatively large irrigable areas (though small within the context of the Basin as a whole). He added that the applicant should not be penalised for this and should be judged on their merits, which in his view include:
- (a) More efficient and productive use of land and water resources;
 - (b) Comprehensive management of resources to agreed standards on an integrated basis so as to avoid effects of significance;
 - (c) Better enablement of both people and communities through long term sustainable and viable use of resources, and
 - (d) Enhancement of stream and terrestrial environments, and protection of valued areas, through uniform farm management practices across large land holdings.
 - (e) Greater ability to respond to and mitigate unanticipated adverse effects through the application of entire farm management systems over large irrigable areas.
- 6.7 Mr Whata then considered Section 104D (non-complying) matters and noted that in his opinion the non complying applications (including this application) meet the S104D test. Based on case law Mr Whata then set out what he considered we may consider under S104D(a) of the RMA.
- 6.8 Mr Whata then went into detail on the existing environment and noted that it is not a pristine natural environment and reflects the reality of dryland farming in a tough environment. He noted that the applicant's property is currently farmed and these activities have an impact on the environment including generating nutrients, waterways not fenced, minimal riparian planting and significant soil erosion.
- 6.9 Mr Whata then considered more broadly, existing activities are affecting the sub catchments and provided a number of specific examples from the applicant's property regarding soil erosion during a recent wind blow event.

The Future Environment

- 6.10 Mr Whata then went into details regarding the permitted baseline in terms of the relevant PNRRP rules. He noted that the permitted activities included: minor takes or diversions for activities such as stock water outside the water bodies identified as being of high natural character; general farming activities such as intensive pastoral grazing, fertiliser application, dryland cropping and ancillary activities.
- 6.11 In terms of land use activities Mr Whata noted that the District Plan permits all farming activities and irrigation (except in Outstanding Landscape Areas in the Waitaki District). Mr Whata stated that the applicant hold a number of resource consents and certificates of compliance that permit certain farm related activities as set out in detail in the evidence of Mr Kyle.

- 6.12 Mr Whata then noted that the applicants have undertaken an assessment of how the ecological values of the property will be affected by applying water to the land. He drew on the other expert witness evidence and noted there will also be ecological benefits, such as improved vegetation cover and exclusion of stock from streams.

Lakes

- 6.13 In terms of effects on Lakes Mr Whata noted that the proposed abstraction will comply with the minimum lake level set out in the WCWARP. He added that overall the take will have no discernible effect.

Streams

- 6.14 Mr Whata referred us to Dr Ryder who considered that the streams within the applicant's property (Serpentine Creek, Wairepo Creek and Six Mile Creek) all appear ecologically degraded relative to typical streams classified as in 'natural state'. He added that riparian margins will enhance the physical character of the streams and maintain (and potentially enhance) the health of local stream aquatic communities. The establishment of a 5m buffer around the areas where water flows will be sufficient to protect and possibly improve existing aquatic ecosystem values, he submitted.

Tangata Whenua

- 6.15 Mr Whata noted that the applicant has been guided by the matters identified through consultation, the CIA and the statutory recognition of the tangata whenua values. He added that the independent expert advice is that the best practice, intensively managed approach adopted by the applicant addresses the concerns expressed by tangata whenua.

Landscape

- 6.16 Mr Whata discussed the issue of the "greening" of the landscape and explained why he considered that it was not relevant to this application. We have discussed this issue in detail in Part A and do not repeat this discussion here.

Cumulative Effects

- 6.17 Mr Whata noted that the applicant has adopted the thresholds given in the WQS. Mr Whata outlined the most stringent mitigation requirements as detailed by Dr Robson. He added that the WQS figures are conservative and worse case nutrient loadings have been assessed. He noted the on-farm nutrient management and mitigation approaches have been developed to achieve these thresholds.
- 6.18 Mr Whata then provided an evaluation of the application in terms of the objectives and policies of the WCWARP and the PNRRP. He noted Part II of the RMA and provided an overview of the application in relation to Sections 5-8. In his evaluation he drew on the evidence of other expert witnesses and the applicant's own evidence.

S42A Issues

- 6.19 In Mr Whata's view many of the concerns set out in the S42A Reports stem from a lack of information, a misunderstanding of the information provided or concerns relating to the WQS. Mr Whata outlined other witnesses' evidence that, in his opinion, addressed these issues.

Owner's submission (Mr Richard Peacocke)

- 6.20 Mr Richard Peacocke (Director, SHL and WHL) told us that he is also a director of Mackenzie Irrigation Company (MIC) which negotiated an agreement with MEL that provided water for irrigation in the Mackenzie Basin.
- 6.21 Mr Peacocke said that his role in this consent process expanded in early 2007 when, as a director of MIC, it became apparent that leadership was needed in order to assess the effects of irrigation on a cumulative scale across the basin. He noted that this need led to MWRL being set up, in which the applicant, Five Rivers Limited and Simons Pass Limited, as shareholders in MWRL, made a commitment to fund up to one million dollars to have GHD undertake the Water Quality Study. Mr Peacocke stated that he has spent over 1,000 hours per annum for 2 years along with Murray Valentine of Simons Pass and Kees Zeestraten of Five Rivers Ltd driving this process.

- 6.22 According to Mr Peacocke when he purchased Glen Eyrie Downs it was in a semi derelict state with little infrastructure and over half of the property (1,200 ha) covered in wilding pines. He added that the natural cover of the land had been long eroded by overgrazing and now comprises mainly browntop and hieracium with some small surviving tussocks around the limited wetland areas.
- 6.23 He told us he has now removed 1,200 ha of wilding pines from the south and western areas of the farm commencing in September 2007 and concluding in February 2009. Removing the wilding pines cost ~ \$2M dollars however, Mr Peacocke noted that it has significantly improved the farm, both in terms of viability, and because wilding pines are considered a pest and a significant threat to the Mackenzie Basin.
- 6.24 Mr Peacocke noted that there is no stock presently being run on the property but historically the farm was used as a wintering block for merinos that were farmed on the Quailburn Run some 5 - 10 km to the southwest during the summer season.
- 6.25 The ongoing damage to the soil as a consequence of wind blow in the Mackenzie Basin is very significant according to Mr Peacocke. In a dry land farming situation the depleted and fragile soils are only partially covered with hieracium and browntop and as a consequence of frost heave in the winter, the exposed soil blows away in the windy spring weather.
- 6.26 Mr Peacocke added that inevitably some soil ends up in the streams, rivers and lakes in the Upper Waitaki Basin. Glen Eyrie Downs has recently suffered a significant soil loss event as a consequence of ground being exposed to wind blow following the removal of wilding pines and the late planting of cover crops by the tenant responsible for the farm.
- 6.27 Mr Peacocke explained that the applicant has been through an extensive process to determine the most viable farming operation for the property. As a consequence of an initiative of Solid Energy NZ Ltd it was agreed in March 2008, pending determination of the applications to gain consent to irrigate the land, that the property be leased to a Solid Energy NZ Ltd subsidiary, Biodiesel New Zealand Ltd (BDNZ). BDNZ have since cultivated the property for the purpose of growing canola and other crops. The 2,135 ha property now consists of 2,038 ha which is either in crop or fallow in preparation for spring planting.
- 6.28 Mr Peacocke explained that for some years Williamson Holdings Limited (WHL, which the applicant has since purchased) had researched and explored the potential productivity of the land, it was concluded that the best return on the land would come from converting the land into an irrigated dairy farm. Accordingly in 2004, WHL applied to the Council to take water from Lake Ohau to irrigate around 2,000 ha on Glen Eyrie Downs.
- 6.29 Mr Peacocke noted that irrigation is the one essential ingredient to successfully undertake the establishment of dairy farming in the Mackenzie Basin. Without irrigation the ability to grow the necessary quantities of grass would be impossible and the alternative of conventional sheep farming on the exposed depleted soils would be marginal at best even with intensification of such farming practice.
- 6.30 According to Mr Peacocke the applicant has developed, with its team of experts, a highly innovative large scale dairy farming operation model. He explained that the farming model proposed includes 6 individual farming management units each employing 3 - 4 permanent staff with appropriate infrastructure being established on each farm.
- 6.31 Mr Peacocke said that the construction of cubicle stables to house the dairy cows has huge environmental benefits. With cows being kept off pasture during the critical months of the year nutrient run-off into waterways, which is usually associated with a typical a dairy farm operation in New Zealand, will not occur.
- 6.32 According to Mr Peacocke, there is considerable opportunity using existing technology to harvest the methane produced in the cubicle stables and recycle it to store for future use as fuel for plant, heating and vehicle fuel. This process would require that the air be extracted from the ceiling of the stables and the methane to be extracted and stored in the covered sewerage ponds adjoining the stables. Mr Peacocke noted that there are technical and cost issues to yet be considered but the potential is definitely under consideration by the applicant.
- 6.33 Mr Peacocke then provided details of his background which included milking cows, owning and running an agricultural business, owning and running a number of sheep, beef, crops and horticultural operations and undertaking large-scale development projects.

- 6.34 From these projects, Mr Peacocke explained, he has experience in employing professional consultants who are charged with working within tight financial and time constraints to deliver predetermined outcomes. He added that he had extensively researched and identified the people and farm management systems required, especially in relation to such things as nutrient management, given the critical importance of those systems to the viability (economically and ecologically) of the farms.
- 6.35 Mr Peacocke said that he is fully aware of the risks due to the scale of the operations they propose to undertake with the development and operation of the farms. He noted that it is particularly topical at this time due to publicity of the risk of failure of large scale farming if the correct management procedures are not adopted. He added that the applicant has the core team of experts ready to commence work once the outcome of the water applications has been determined.
- 6.36 In terms of the practicability of the proposed intensive farming and the associated mitigation measures required, Mr Peacocke accepted that the proposals are heavily capital intensive and require a very significant upfront investment in infrastructure and mitigation (irrigation, cubicle stables, riparian planting). He explained it is for this reason that the applicant needs to intensively utilise the farm as a whole.
- 6.37 Mr Peacocke stated that the proposed nutrient management systems (e.g. cubicle stables) will bring significant improvements in productivity. Mr Peacocke also noted that the applicant is exploring biological fertiliser options which may further enhance nutrient management and improve efficiency and ability to avoid the effects ordinarily associated with intensive dairy farming.
- 6.38 In regards to the concerns regarding the ability to respond to unanticipated monitoring results Mr Peacocke stated that this does not present as a significant hurdle in the case of the farm management system proposed. He noted that the applicant can directly manage the primary cause of nutrient loading through its effluent management systems, including if necessary through offsite disposal.
- 6.39 He added, given the significant investment that will have been made by this point, the applicant will be highly motivated to respond swiftly and appropriately.
- 6.40 In Mr Peacocke's view the farm will benefit greatly from irrigation. It will stabilise the soil and assist in the establishment of grasses, prevent wind blow soil, prevent the re-establishment of wilding pines (due to intensive management) and contribute significantly over a very short time to the economic wellbeing of the Mackenzie Basin.
- 6.41 He noted that Glen Eyrie Downs has in the past run stock in the winter period only and anecdotally he understands ran 2,000 wethers that in turn were fed hay and grain/meal for the period they were wintered on the farm. No significant stock numbers can be carried during the summer period due to the eroded nature of the soil and the lack of moisture.
- 6.42 With irrigation and modern farming practices, the applicant proposes to farm 7,000 cows on Glen Eyrie Downs lifting the carrying capacity from 0.2 to 20 stock units per hectare making it a much more efficient and viable operation in Mr Peacocke's opinion.
- 6.43 Mr Peacocke noted that in the event that SHL and WHL are not successful in gaining consent to take water, these companies would have expended considerable capital and the farms will be in a difficult position. The future for growing oil seed rape on Glen Eyrie Downs as a dryland crop is limited due to low natural fertility, fragile soils and the lack of viability of the industry at this time according to Mr Peacocke.
- 6.44 According to Mr Peacocke the future for the Glen Eyrie Down's property without irrigation would likely be an amalgamation with adjoining farms to enhance scope and overall viability or reversion to forestry, which based on recent history with wilding pines, would appear to be a realistic fallback position. Granting of these resource consents, according to Mr Peacocke, presents a unique opportunity to make these land blocks highly productive and create a positive economic benefit to SHL, WHL and the District.

Consultation

- 6.45 Mr Peacocke explained that the applicant had engaged in extensive consultation with key stakeholders including Ngai Tahu, DoC, LINZ, Fish and Game, Ngai Tahu and the QEII Trust to help understand the concerns they have regarding the plans to irrigate Glen Eyrie Downs.
- 6.46 Mr Peacocke noted that he has personally been involved in consultation with DoC, Ngai Tahu and QEII Trust. He added that they first consulted with DoC in relation to wilding pine removal. According to Mr Peacocke DoC were very supportive of the proposal to remove the wilding pines from a fire risk perspective.
- 6.47 Mr Peacocke explained that he met with 5 Ngai Tahu representatives and showed them around Glen Eyrie Downs. He acknowledged that their main concerns were around the protection of waterways and flora and fauna in the vicinity of the streams and river. Consequently, Mr Peacocke explained the mitigation proposals for the management of effluent and waterway protection that SHL and WHL were proposing. In the course of the site visits the Ngai Tahu representatives did not identify any wahi tapu or mahinga kai sites according to Mr Peacocke.
- 6.48 The applicant has also consulted the QEII Trust in relation to the part of the Glen Eyrie Downs that is subject to a QEII covenant according to Mr Peacocke. These discussions have been positive and Mr Peacocke noted that he has been advised by Dr Brian Molloy that the QEII Trust will be withdrawing their submission relating to Glen Eyrie Downs.
- 6.49 Mr Peacocke noted that he had attempted to consult with the Blue Family in relation to their submission via the applicant's on farm manager and Mr John Ryan, (farm management consultant for Ribbonwood and Shelton Downs adjoining Glen Eyrie Downs), but without result to date. He added that the applicant will continue to try to meet in order to understand and, if possible, address their concerns.

Planning Framework (Mr John Kyle)

- 6.50 Mr John Kyle (Partner, Mitchell Partnerships Limited) was engaged by the applicant (and Five Rivers Ltd, Williamson Holdings Ltd and Killermont Station Ltd) to present evidence with respect to various planning documents (Regional Documents and RMA) as well as site specific evidence relating to overall mitigation and conditions.
- 6.51 Mr Kyle outlined the relevant planning documents and which plan the applicant's activity relates to. He noted the 'permitted baseline' concept and added that in terms of relevant Regional Plan rules the permitted baseline is limited to minor takes or diversions for activities such as stock water. In Mr Kyle's opinion, general farming activities such as pastoral grazing, fertiliser application and ancillary activities are also permitted under the PNRRP.
- 6.52 He also added that in terms of land use effects, farming activities are generally permitted in the Waitaki District and he provided a list of these permitted activities from the Waitaki District Plan. Given the permitted baseline that prevails, it is Mr Kyle's opinion that the landscape issues generated by farming activities are generally not significant.
- 6.53 Mr Kyle then went on to discuss the relevant matter from the RMA including Part II and Section 104 matters. He considered that the proposed abstraction and use of water for irrigation throughout the Upper Waitaki catchment will not generate any significant Part 2 (RMA) issues. He added that the total abstraction is within the limits established by the WCWARP and is consistent with the agreements in place between the MIC and MEL. With the appropriate mitigation and management in place, it was Mr Kyle's view that the proposals will not generate significant adverse effects on the receiving environment.
- 6.54 Mr Kyle stated that the RMA does not seek to prevent changes to the environment. Rather, it seeks to provide for the use and development of natural and physical resources, subject to the provisions in Section 5. In regard to these applications, in Mr Kyle's opinion the ability to irrigate land will provide significant social and economic benefits to people and communities. These benefits arise from the employment of people on the farms, increased land productivity, and flow on social and economic benefits (e.g. secondary industries, employment) on a local, regional and national level. He added that with appropriate mitigation which is set out within the suggested conditions, values such as the life supporting capacity of the water resources will be safeguarded, and in some cases enhanced (localised waterways and riparian margins). Furthermore he noted that the mitigation proposed will ensure that the applications will not compromise the

values of the water resource and its ability to provide for existing uses and meet the needs of future generations.

- 6.55 Mr Kyle then discussed in depth the policies and objectives of the WCWARP and PNRRP and how the applicant's activities abutted with these Policies and Objectives.

S42A Officers Report

- 6.56 Mr Kyle noted that the Section 42A report stated that the use of water for stock and domestic purposes was included in the application for CRC040835, but was not included in the notification wording. Mr Kyle confirmed that the applicant still wishes to take water for stock and domestic supply. He added that taking water for an individual's reasonable needs for domestic and stock water is a permitted under the provisions of the RMA (Section 14(3)(b)), and therefore there is no issue as to whether or not this was specifically included in the public notice.
- 6.57 In regards to site specific evidence Mr Kyle drew on the evidence of Mr Brown, Dr Ryder and Dr Robson (discussed below).
- 6.58 In regards to landscape effects Mr Kyle noted that based on the evidence of Mr Brown, it is his view that the visual effects of the pivot irrigators, the greening of the irrigated areas and the cubicle stables are acceptable and will not give rise to effects which are more than minor.
- 6.59 In regards to effects on terrestrial ecology Mr Kyle stated that based on the evidence of Dr Bartlett it is his opinion that the effects on ecosystems will be avoided or mitigated such that they will be less than minor.
- 6.60 Mr Kyle acknowledged that the Reporting Officer considered that the proposed 14,808,000m³/yr originally applied for is an inefficient take and use of water and recommends that a volume of 12,451,500m³/yr would be more appropriate. As outlined in the evidence of Mr McIndoe the applicant is now seeking consent for 12,408,000m³/year. Mr Kyle noted that this is consistent with the Reporting Officer's recommendation and is considered to be a reasonable and efficient use of water. We note that the revised volume requested by the applicant is a direct result of a reduction in the proposed area to be irrigated rather than any change in efficiency.

Supplementary Evidence

- 6.61 Mr Kyle also provided supplementary evidence on 15 October 2009 in response to the Panel's interest in those applications that have been filed by the applicant but have yet to 'catch up' with the applications being considered here. Mr Kyle explained that the applicant has also sought:
- (a) Fertiliser and agrichemical application (Certificate of Compliance). Mr Kyle noted that the Council Officer for this CoC application maintains that a CoC cannot be issued as the TRP does not expressly permit the application of agrichemicals and fertiliser.
 - (b) Effluent disposal (Discharge Permits). According to Mr Kyle permits to discharge an average of 378,000 litres per day of undiluted dairy cow effluent (solid and liquid) on to land by spray irrigation and the consequent discharge of contaminants to air have been applied for. It is noted by the Panel that these applications have been 'called-in' by the Minister for the Environment pursuant to Section 142 of the RMA and the applicant has subsequently withdrawn these applications.
 - (c) Crop Production (Certificate of Compliance). Mr Kyle noted that the Council Officer for this CoC application maintains that a CoC cannot be issued as any activity in this area (Zone 1B) that may result in contaminants entering groundwater or surface water is non-complying. Mr Kyle noted that the applicant disagrees with this interpretation.
- 6.62 Mr Kyle acknowledged that all of the consents are in some way associated with the intensification of farming. This intensification is reliant upon the applicant first obtaining consent to abstract water in the manner proposed. Without that water it is highly unlikely that the applicant will pursue the various consents in question. As such these consents can be viewed as being secondary, and in Mr Kyle's view there is no need to have these matters considered now as is suggested by some of the submitters.
- 6.63 The focus for this hearing as Mr Kyle understood it, relates to the proposed water based consents to abstract and use water for irrigation purposes. In his assessment, the information

accompanying these applications is sufficiently robust to enable a full assessment of all the relevant effects to be carried out.

Proposed Activity (Ian McIndoe)

- 6.64 Mr McIndoe (Senior Engineer, Aqualinc Research Limited) noted that the proposal is to take water at a maximum rate of 1,200 l/s, 103,680 m³/d and up to 12,408,000 m³/y annually from the Lake Ohau for irrigation of up to 2,068 ha of land, and for dairy shed use, stockwater and domestic use.
- 6.65 Mr McIndoe then outlined a number of changes that have been made to the application since it was notified in August 2007. These changes included a reduction in irrigation area from a combined area of 2,500 ha of Glen Eyrie Downs, Shelton Downs and Ohau Downs, down to 2,068 ha of Glen Eyrie Downs. Consequently, he explained that a reduction in annual volume from 15,000,000 m³ to 12,408,000 m³ is proposed.
- 6.66 Mr McIndoe provided a description of the land including the topography and the soils. In regards to the soils Mr McIndoe noted that the predominant soil type within the applicant's property is the Ohau Series. Various other soil types are also present in smaller proportions, including Fork, Pukaki-Holbrook associations, Cass-Craigieburn-Cox associations, and Buscot-Sawdon associations. Consequently, the PAW values across the property range between 65 mm and 130 mm, according to Mr McIndoe.
- 6.67 Mr McIndoe then listed the waterways and other sensitive areas located in the vicinity of the applicant's property. These include: Six Mile Creek; Wairepo Creek; Serpentine Creek; Wairepo Kettleholes (DoC reserve); Maori Creek; Ohau Downs QEII covenant area, DOC marginal strip reserve and Lake Ohau.
- 6.68 Mr McIndoe told us the applicant proposes to use 26 centre-pivots (16 full circle, 10 half or part circle) and potentially K-lines in gaps and corners as fillers. On-farm pipelines will be PVC pipe or similar, buried with minimum 400 mm cover. Mr McIndoe noted that overhead power lines will be used to supply electricity to pumps, irrigators and other infrastructure.
- 6.69 The irrigation system will be designed, according to Mr McIndoe, so that pivots have the capacity to apply 5.0 mm/day over the 2,068 ha. Consequently, based on a return period of 2-5 days, the pivot application depths will be between 10-25 mm. The K-Line application depths and return periods will be adjusted according to the relevant soil type to apply water efficiently. Mr McIndoe noted that all practical means will be taken to ensure that the depth of water applied does not exceed that required for the soil to reach field capacity.

Stockwater

- 6.70 Stock water is required for up to 7,000 dairy cows over the 2,068 ha. Based on a peak daily water use of 70 l per cow, Mr McIndoe noted that this equates to a peak daily volume of 490 m³ per day and 122,500 m³ per year (based on 250 days at the peak rate).
- 6.71 Mr McIndoe noted that this volume is proposed to be taken from the total allocation for the property and will be sourced from the Lake Ohau together with the irrigation water. Mr McIndoe added that the stockwater will be reticulated around the property using polyethylene pipelines and no discharge from the stock water distribution system will occur. Mr McIndoe added that where stockwater requirements exceed that stated above, additional stockwater will be taken under Section 14(3)(b) of the RMA.

Protection of Waterways (Ian McIndoe)

Serpentine Creek

- 6.72 Mr McIndoe noted that the main branch and several minor branches of the Serpentine Creek flow through the south-eastern corner of Glen Eyrie Downs for approximately 4.5 km (refer Figure 1). He added that based on the indicative irrigation design, two centre pivot irrigators may need to cross over two minor branches of the creek that would require bridges to be installed.
- 6.73 Mr McIndoe acknowledged that consequently, water from the irrigators will be sprayed directly into the streams at the crossing points, however no fertilisers will be added to the irrigation water and therefore there should be no adverse effect as a result of the irrigators crossing the streams.

Wairepo Creek

- 6.74 Approximately 1.3 km of Wairepo Creek crosses the centre of the property between the DoC reserve and Ohau Downs (refer Figure 1). Based on the indicative irrigation design plans that have been created for the applicant's property, Mr McIndoe noted that irrigators will not cross over the creek, however irrigation will occur along the northern side of the creek.

Six Mile Creek

- 6.75 Six Mile Creek runs across approximately 480 m of the top north eastern corner of Glen Eyrie Downs (refer Figure 1). At that location, it contains two branches, a northern branch, which flows continuously and a southern branch that flows only when there are saturated conditions and heavy rain according to Mr McIndoe.
- 6.76 Based on the indicative irrigation design plans that have been created for the applicant's property, irrigation may take place in the vicinity of the current location of the south branch of the creek. Mr McIndoe acknowledged that the applicant is proposing to apply for consent to divert the south branch into the north branch upstream of the proposed irrigated area before irrigating that area. However, in the meantime, irrigation is proposed to occur along the southern side of the creek.

Mitigation – fencing off streams

- 6.77 To mitigate the potential adverse effects of irrigating adjacent to the creeks, Mr McIndoe told us the applicant will fence off the creeks approximately 5 m from the banks to prevent stock access and will establish riparian vegetation, where necessary, between the creek banks and fences.
- 6.78 He added that where remnant tussocks exist along the creek margins, it is likely that they will expand once the creek is fenced, and therefore no further plantings would be required in such areas. Where the riparian margin is dominated by exotic grasses and weeds, riparian plantings will be undertaken.
- 6.79 Additionally, Mr McIndoe noted, the applicant will monitor the irrigation of land adjacent to the waterways for runoff. Where irrigation runoff is found to be occurring, measures will be put in place to mitigate the effect on the streams.
- 6.80 Mr McIndoe stated that where stream crossings are required they will be constructed to ensure that the riparian strips and streams are not damaged from the centre pivots passing over them. The crossings will be created from either pre-cast concrete slabs or culvert pipe depending on the length of the required crossing.
- 6.81 Mr McIndoe noted that the stream crossings will be designed to avoid runoff from the crossing entering waterways. He added that this will be achieved by constructing a low lying level bund to reduce run-off into the waterway from the crossing.

Ohau Downs QEII Covenant area

- 6.82 The main potential effect on the covenant area from the applicant's proposed irrigation is in regard to water quality effects according to Mr McIndoe (refer Figure 1 for location of the QEII area). This is based on the covenant area being situated in the potential receiving zone of irrigation surface runoff in the most northern corner of the property.

Wairepo Kettleholes (DoC Reserve)

- 6.83 Mr McIndoe acknowledged that local DoC staff indicated in initial discussions that they do not perceive there to be any adverse impacts on the DoC Reserve from the proposed irrigation, provided any waterways are fenced. He added that the DoC Reserve is fully fenced off from the applicant's property. Furthermore Mr McIndoe noted that, with the exception of the proposed irrigation area directly to the west of the reserve, the elevation of the DoC Reserve tends to be higher than the areas proposed to be irrigated, which slope down away from the reserve in a southeast direction. In his opinion this will reduce the potential for runoff to occur into the reserve.
- 6.84 Mr McIndoe stated that the applicant will monitor the irrigation of land adjacent to the covenant area and DoC Reserve for runoff. He added that where irrigation runoff is found to be occurring, measures will be put in place to mitigate the effect.

Farm System (Robert Englebrecht)

- 6.85 Robert Engelbrecht (Director, Robert Engelbrecht Consultancy Ltd) provided a brief overview of the applicant's proposed activity and outlined the information (including site visit) he has used to make his assessment. Mr Engelbrecht's evidence covered:
- (a) A description of the importance of farm management in New Zealand and the Upper Waitaki.
 - (b) A peer review of the FEMPs prepared by GHD and an assessment of the practicality and feasibility of the proposed farm management techniques outlined in the FEMPs.
 - (c) An assessment of the practicality of the auditing and monitoring proposed in the conditions/FEMP.
- 6.86 Mr Engelbrecht provided a description of the current land use on the property and the farming system proposed under the irrigation. Mr Engelbrecht noted that he has visited the property three times which included inspecting the soils and other physical features.

Importance of Farm Management (and Farming)

- 6.87 Mr Engelbrecht provided evidence on the importance of farming for New Zealand on global scale and local markets.

FEMP

- 6.88 Mr Engelbrecht then provided general comments on the applicant's FEMP from a farm management point of view. For the proposed irrigated area of Glen Eyrie Downs, Mr Engelbrecht noted the main site specific environmental risks included soil risks (wind and water erosion), run-off (into waterways), bio-diversity and trafficking of soil.

Feasibility of Irrigation Development

- 6.89 Mr Engelbrecht noted that the proposed dairy farm development for the applicant's property involves six similar sized units (average 345 hectares), carrying an average of 1,205 milking cows each (3.5 cows per hectare equivalent), with replacement heifers grazed off site. He used an average production per cow of 400 kg milk solids, but believed that higher production is probable, but the choice of target production will depend upon the milk solids payout relative to the cost of imported supplementary feeds.
- 6.90 Mr Engelbrecht noted that the return on the very substantial investment made in the cubicle barn dairy farms is very satisfactory (compared with other conventional farming systems), both on total farm capital, and on owners' equity in the businesses. Mr Engelbrecht said even at a \$4.50 per kg milk solids payout the payout would be satisfactory (when compared with most conventional farming businesses).
- 6.91 Mr Engelbrecht then outlined the mitigation, monitoring and auditing of the FEMP. He noted if and when it is necessary, farmers are very good at following and complying with these types of rules provided that they always understand the logic of the recommendations. For this reason, in his opinion, a detailed and thorough education programme needs to be undertaken, firstly with farm owners and/or managers and secondly with senior staff, if not all farm staff over time. He added that the new generation of farmers usually have better familiarity and understanding of the techniques required and the confidence to use appropriate computer programmes.
- 6.92 According to Mr Engelbrecht the OVERSEER programme should be continually reviewed throughout the season on individual farm properties, and different areas of those farms, when and where appropriate, to ensure that there is no excess use of fertiliser, after fully accounting for the contributions made by livestock and/or (in the case of the cubicle barn dairying operations) dairy effluent, whether liquid (via the centre pivot irrigators) or solids (spread over the land by machinery) to ensure that the nutrient budgets are maintained in the appropriate balance relative to soil nutrient reserves and pasture requirements.
- 6.93 Mr Engelbrecht also outlined the advantages of cubicle dairy farming in his view which include, control of effluent, reduced fertiliser application, more efficient conversion of feed and improved pasture dry matter production, capitalise on a significant winter milk premium, improved animal

health and thrift, as a consequence of the more controlled and favourable environment for the milking cows.

Cubicle Dairies and Effluent Disposal (David Borrie)

- 6.94 **David Borrie** (Senior Environmental Engineer, Aqualinc Research Ltd) was engaged by the applicant (and two other applicants subject to this hearing process) in relation to the collection, storage and spreading of dairy effluent from the proposed dairy sheds and cubical cow barns.
- 6.95 While Mr Borrie's evidence mainly related to effluent disposal, the applications for which were 'called-in' and subsequently withdrawn, we have considered his evidence in the context that it helps us to understand how the total nutrient load resulting from this take and use application, is derived.
- 6.96 Mr Borrie noted that it is proposed that the cows will be housed in cubicle barns for 100% of the time during the months of March to October and for 50% of the time during the summer months of November to February. The pasture on the properties will primarily be harvested under a cut-and-carry operation for feeding to the cows housed in the cubicle barns, with only limited grazing by the cows during the summer months.
- 6.97 He told us that on each of the stand alone dairy farms the cows will be housed in two cubicle barns each housing between 500 to 650 cows. The cubicle cow barns are enclosed barns (150 m x 33 m) built on a concrete floor. The barns comprise of cubicles for the cows and a concrete channel along the back of each cubicle to collect the cows' excreta. The feed is transported into the barn for the cows and the cows' effluent is collected by a mechanical scraper system.
- 6.98 Mr Borrie noted that the cows on each of the dairy farms will be milked at the properties by conventional methods for factory supply for up to 300 days of the year. On each of the stand alone dairy farms there will be a dairy shed for milking the cows. The cows will be walked from the cubicle barn to the adjacent dairy shed for milking.
- 6.99 On the basis that each cow produces approximately 54 l of raw effluent per day, the total volume of raw effluent collected during the period while the cows are housed for 100% of the time from a 1,000 cow herd will be approximately 54 cubic metres per day.
- 6.100 Mr Borrie said that the system at the dairy sheds and the cubicle cow barns has been designed to minimise water use. He estimated that with wash down water from the dairy sheds and the cubicle cow barns, plus an allowance for dirty stormwater, the average total diluted effluent per day would be approximately 125 l/cow/day (i.e. 54 l of raw effluent plus 70 l of washdown water and drainage water). For a 1,000 cow dairy herd this would equate to 125 cubic metres per day of diluted effluent.

Effluent Collection System

- 6.101 Mr Borrie told us that the excrement produced from both the dairy shed and the cubicle barns will be scraped and discharged into a sump. From the sump the effluent will be pumped to a mechanical solids separator, such as an effluent press, to separate the solids.
- 6.102 The liquid effluent exiting the solids separator will be discharged into a storage pond until the summer months (i.e. October to March) when it will be applied to the areas designated for effluent application. The separated solids will be stored on a concrete pad or in a concrete bunker and these solids will be spread over the property predominantly during the summer months.

Effluent Storage Ponds

- 6.103 Mr Borrie said that the proposed holding capacity of the liquid storage pond on each of the dairy farms will range from 30,000 to 37,000 cubic metres which will be able to provide for up to seven months storage.
- 6.104 He told us that each storage pond will be of earth construction partly below ground level and partly above ground level such that approximately 50% of the storage volume would be below existing ground level. The storage ponds will be lined with an impermeable geotechnical fabric liner to achieve a seepage rate not exceeding 10⁻⁸ metres per second.

Effluent Discharge System

- 6.105 Mr Borrie explained that the liquid effluent will be pumped from the storage pond and applied to the land by the centre pivot irrigators that are used to apply the irrigation water to the properties. The applicant proposes to inject the liquid effluent into the irrigation water prior to it being irrigated onto the land. The liquid effluent will be injected into the irrigation water at a ratio of approximately 5-10%. For example an application depth of 1 mm of effluent would equate to a nitrogen application of approximately 20 kg nitrogen/ha.
- 6.106 He told us the quantity of liquid effluent applied to the land per pass by the centre pivot irrigators will be determined according to the nitrogen requirement of the pastures. The total application depth per pass of the irrigator (i.e. irrigation water plus liquid effluent) will be less than half of the average water holding capacity of the soils. The liquid effluent will only be discharged to land during the summer months of October to March each year.
- 6.107 The separated effluent solids will be spread onto the property, by a travelling mechanical solids spreader, over the total area of the property. The quantity of solids applied to the land will be determined according to the nitrogen requirement of the pastures.
- 6.108 The size of the liquid effluent storage pond (providing for up to 7 months storage) and the separated solids storage pad will provide adequate backup in the event of pump or machinery breakdown and will also ensure that effluent is not discharged during undesirable weather conditions, such as during periods of heavy rain, frozen or snow covered ground.

Efficient and Reasonable Use (Ian McIndoe)

- 6.109 Mr McIndoe explained that the annual volume of water for irrigation that has that has been applied for is 12,408,000 m³/year, which was based on the MIC share allocation of 6,000 m³/ha/year over the irrigation area. Mr McIndoe noted that irrigation demand modelling using IrriCalc, a crop-soil water balance model, was undertaken for the applicant's property to determine whether the 6,000 m³/ha/year that has been applied for is reasonable.
- 6.110 He explained that the model was used to assess the volume of water that would have been required each season, for the period 1973-2008, from which the 80th percentile was calculated. The results indicated that the seasonal irrigation requirement 80 percent of the time, (assuming 80% application efficiency) ranges between 587 mm and 700 mm over the various soils.
- 6.111 Consequently, an annual allocation of 13,391,000 m³/y for the 2,068 ha (or 648 mm/year, on average) is required to meet full irrigation demand every four out of five years according to Mr McIndoe. He noted that this exceeds what has been applied for (12,408,000 m³/y), and shows that the proposed take will meet the reasonable use test.
- 6.112 Furthermore he noted that the analysis indicated that the applicant may have insufficient water to fully meet demand more frequently than 20 % of the time. Mr McIndoe noted that the applicant will therefore have to manage the proposed irrigation system to achieve an application efficiency greater than 80 % to ensure that significant yield losses do not occur in extremely dry years. He added that soil moisture monitoring is proposed to be carried out to ensure over-watering does not occur and maximum possible water use efficiency is achieved.

Surface Runoff

- 6.113 Mr McIndoe told us that the SPRINK model was used to assess the amount of irrigation redistribution runoff, when varying the return period, applied depth and application rate. He told us this modelling demonstrated that under a worst-case scenario, irrigation redistribution is possible. He added that the potential problem is mostly due to the lower infiltration characteristics of the Ohau soils.
- 6.114 The greatest potential for adverse effects, according to Mr McIndoe, will be in the most northern corner of the property where the ground slopes towards the QEII covenant area. He added that runoff is also possible in a small area to the south of the DoC Reserve, and into Serpentine Creek.
- 6.115 Mr McIndoe noted that irrigation runoff will be closely monitored by the applicant. He added that where irrigation runoff is shown to occur and threatening any of the sensitive areas or waterways, measures will be put in place to reduce runoff. Such measures may include reducing application depth and return intervals, placing pivot hoses outside span pipes, or installing boom

backs and using variable depth sprinkler system. He added that these measures will also improve application efficiency.

- 6.116 To further reduce the risk of runoff into waterways such as the Wairepo, Six Mile and Serpentine Creeks, Mr McIndoe noted that the applicant is proposing to fence off the creeks approximately 5 m from the bank to prevent stock access, and will establish riparian vegetation, where necessary, between the creek bank and fence.

Effects on Lake Ohau (Ian McIndoe)

- 6.117 The main environmental effect from the taking of water from Lake Ohau relates to the effects on the Lake Ohau water levels according to Mr McIndoe. Based on the proposed abstraction limit of 103,680 m³ per day and 12,408,000 m³ per year, the maximum effect on the lake levels is equivalent to only 0.0016 m over a day or 0.2 m over a year according to Mr McIndoe's calculations. Furthermore he added that the proposed annual volumetric take represents only 0.31 percent of the 4.02 km³ volume of water held in the lake and 0.4% of the annual volume flowing through the lake. He noted that because irrigation demand will vary from year to year, the actual effect will be significantly lower than this figure.
- 6.118 Mr McIndoe explained that MEL controls the level of the lake between 519.75 and 520.4 metres, which will not change as a result of the proposed abstraction. While the volume of water released down the canal will be affected Mr McIndoe said that MEL has provided derogation approval to the applicant. Furthermore, he added that the applicant is proposing to comply with the minimum lake level of 519.45 m above mean sea level, as specified in the WCWARP for Lake Ohau.
- 6.119 Mr McIndoe acknowledged that the primary control in regards to water allocation in the region is through Rules 2, 3 and 6 of the WCWARP. Rule 6 require that the taking, damming, diverting, and using of water is within the allocation limit for the particular water body and is subject to any minimum lake levels specified in the WCWARP.
- 6.120 The applicant is seeking a total volume of 12.408 million m³ from Lake Ohau. Mr McIndoe noted that according to a recent investigation by Duffill Watts and the Council, all existing and proposed abstractions upstream of the Waitaki Dam for agricultural and horticultural activities comply with the 275 m³ allocation limit.
- 6.121 However, he acknowledged that the proposed abstraction of 12.408 Mm³/y exceeds the 12 million m³ limit for abstractions above the Lake Ohau outlet by 0.408 Mm³/y, and is therefore a non-complying activity pursuant to Rule 16 of the WCWARP.
- 6.122 Because Lake Ohau water levels are controlled by MEL and because the applicant is proposing to comply with the minimum lake level set out in the WCWARP, Mr McIndoe noted that Lake Ohau will continue to operate within its normal water level range. Therefore, again he reiterated the only effect of the take is in relation to the effect on MEL in terms of power generation and MEL has provided derogation approval for the proposed activity.
- 6.123 The potential effects on recreational users from the proposed activity in regards to the effect on lake levels are minor according to Mr McIndoe.
- 6.124 Various community abstractions and individual abstractions for domestic and stockwater purposes around the lake occur either from tributaries of the lake or from groundwater according to Mr McIndoe. Given this and, as the proposed abstraction will not result in a change to the lake levels, Mr McIndoe stated, that the effect on surrounding community, domestic and stock water supplies is minor.

Landscape (Stephen Brown)

- 6.125 Stephen Brown (Landscape Architect, Stephen Brown Environments Ltd) was engaged by the applicant (along with three other applicant's subject to this consent process) to assess the landscape effects of their combined implementation. Mr Brown explained that in undertaking the evaluation he has focused upon the following:
- (a) key components of the applications that would, or could, have landscape implications;
 - (b) existing landscape character (both at present and as they are currently evolving);

- (c) the catchments and audiences likely to be affected by the proposed water abstraction and irrigation;
- (d) changes to the landscape character and values of the Waitaki Basin; and
- (e) determination of the appropriateness of such effects in relation to the current statutory environment that manages the landscape of the Waitaki area.

6.126 Mr Brown stated that the pivot irrigators, in his opinion, would comprise the most visible structural components of the irrigation schemes proposed. The irrigators, would also, in conjunction with fertiliser enhancement of the subject properties, result in the greatest direct change to the landscape of the southern Waitaki Basin by modification of the vegetation cover. Consequently, although such modification may well be regarded as an effect in its own right, it is also a 'component' of change associated with the proposed irrigation system that would generate its own effects in relation to the wider Waitaki landscape.

6.127 Mr Brown then provided a description of the Basin. For the applicant's property he noted the farm occupies the alluvial terraces south of Lake Ohau and, for the most part, occupy land that has been subject to grazing for a considerable period of time and until recently was occupied by 1,200ha of wilding pines. He noted that most of the landscape of the applicant's stations is open and almost flat. The bulk of the property has been used regularly for pasture – including that on more undulating terrain between Six Mile Creek and Quailburn Creek and Road, which is presently covered in a mixture of coarse grass species, weeds and the odd remnant clump of tussock. He noted that closer to Quailburn Rd, the applicant's property is also covered in the remains of a canola (biodiesel) crop.

6.128 From Wairepo Creek through to Quailburn Rd, he told us, the landscape descends into a sequence of localised stream terraces, wetlands and depressions around the Wairepo Creek corridor, and feeder ponds further south. He added that the DoC Reserve is almost surrounded by Glen Eyrie Downs, effectively separating the application property into two halves, and the land within its southern 'half' rises from the vicinity of the Wairepo Creek through a series of secondary ridges and saddles, before descending again towards the Quailburn Creek and road.

6.129 Mr Brown then discussed amenity values associated with the property including any high Natural Character values and outstanding landscapes. Mr Brown went into detail regarding these points including the relevant sections of the RMA and applicable case law and his assessment framework. A summary of the key points from the applicant's property is included below:

6.130 In Mr Brown's opinion only limited parts of the applicant's property qualify as true Outstanding Natural Landscape (ONL). In saying this he added that the QEII covenanted part of the Ohau Downs property (that adjoins the applicant's northern boundary - refer Figure 1) contains a number of ponds, bogs and wetlands, together with rock outcrops and tussock country, south of Lake Ohau and Maori Cove that, in his opinion display significant naturalness, endemic quality, expressiveness, legibility and cohesion. Although perhaps not outstanding when viewed in isolation, he consider that the covenanted area still qualifies as such when appreciated as part of a much more extensive ONL.

6.131 The Waitaki District Council has, identified a series of ONL and Rural Scenic Zones within an Amendment Plan. Mr Brown noted that these proposed areas include the southern margins of Lake Ohau and an area embracing the various lagoons, wetlands, moraine and tussock areas around and south of Maori Cove extending into the QEII protected part of Ohau Downs, and the very northern corner of the applicant's property and the DoC Reserve in the centre of the applicant's property. Mr Brown said that he did not agree with the DoC Reserve being included as an ONL. The reasons for his disagreement were provided in his evidence.

6.132 Mr Brown went on to discuss natural factors including relevant case law. He noted that in his opinion the margins of Lake Ohau and the Wairepo Creek corridor (broadly within the DoC Reserve) retain a significant and high degree of natural character receptively.

Effects in General

6.133 Mr Brown described the visual effects in general that included the establishment of Irrigation systems (pivots), the greening of irrigated areas, establishment of associated intake structures and pipelines and cubicle barns. A summary of Mr Brown's evidence on general landscape effects has been included within Part A of this Decision and is not repeated here.

Site Specific Landscape Effects

- 6.134 Mr Brown noted that most of the station is enclosed within a bowl formed by the surrounding mountains and foothills. Mr Brown added that the applicant's property is accessed via Quailburn Rd, a minor access road that services farm properties in the vicinity of the application, however, a series of ridges, as well as a pine woodlot and shelterbelts on neighbouring Ribbonwood Station, screen most of the farm from that road corridor. Mr Brown added that even though some 13 pivot irrigators are proposed south of the Wairepo Creek and DoC Reserve, many of the proposed irrigators north of the Serpentine Creek and an associated ridgeline would be 'lost' over that ridge.
- 6.135 The farm is also distantly exposed to Lake Ohau Rd, but with the nearest part of the applicant's property some 3 km from that road which provides access to the Ohau Ski Area some 10 km to the west. In Mr Brown's opinion the proposed irrigation and greening of the station landscape would tend to register within the far middle distance, or background, of views from this quarter. This would be reinforced by the flat viewing angle across an intervening Ohau Downs Station, while the much more dissected moraine landscape closer to Six Mile Creek and Raupo Lagoon, significantly screens the Station from viewing closer to both Lake Ohau and the ski field.
- 6.136 Even when visible from Lake Ohau Rd, the combination of viewing distance, the lightweight nature of the pivot irrigators and the backdrop of both pasture and shelterbelts on the Ribbonwood property would substantially absorb the major components of the application according to Mr Brown.
- 6.137 Although the four pairings of cubicle barns north of the DoC Reserve, within Lake Ohau Rd's theoretical visual catchment, would be physically more substantial, their location some 4 km or more from Lake Ohau Rd and dispersal across some 1,600 ha of the Glen Eyrie Downs Station landscape would minimise their impact according to Mr Brown. He added that they would also sit low within the physical canvas south of Ohau Downs and would remain visually recessive, avoiding any direct interaction with the main landscape features of the area focusing upon Ben Ohau, the Ohau Range and Lake Ohau or conflict with views to them.
- 6.138 He told us the cubicle barns, being large concrete floored sheds, are capable of housing 650 cows at a time. The structures are typically in the order of 30m wide, up to 6.7m high at their roof apex, and are either approximately 125m long without rotary milking plant attached or around 150m long with the rotary milking plant appended to the main sheds. These sheds he said would be paired and linked to slurry holding ponds in their immediate vicinities. Mr Brown's annexure 4A and B provided graphic illustrations of the sheds.
- 6.139 The same situation would not apply next to Quailburn Rd, with one pair of cubicle barns and ancillary structures/infrastructure located directly adjacent to the roadway according to Mr Brown. However, in his opinion this is precisely the sort of clustering of farm buildings and activity which already occurs on local stations and both of the barn pairs proposed would sit within a relatively discreet part of the rural landscape that has much more limited connection with the key visual features that he described.
- 6.140 Mr Brown noted that while the DoC Reserve is clearly a feature of the application site, it is much more remote and recessive in relation to those parts of the Upper Waitaki that are accessible to, and which are accessed by, the wider community. In Mr Brown's opinion, it fulfils the clear role of a conservation area whose function as an ecological reserve is enhanced by its physical isolation. Mr Brown supports its protection and the avoidance of it by the irrigation proposals, but did not believe that its virtual encirclement by pivot irrigators was of real moment in relation to landscape values and effects.

Groundwater environment and Nutrient Discharge Allowance – Dr John Bright

- 6.141 Dr John Bright (Managing Director, Aqualinc Research Ltd) was engaged by the applicant (in conjunction with three other applicants subject to this consent process) to provide evidence on the following issues:
- (a) Development of Farm Environmental Management Plans (FEMPs).
 - (b) Description of the local groundwater environment that is potentially affected.
 - (c) Identification of what the site specific nutrient discharge allowances.

- (d) Description of the on-farm nutrient leaching and groundwater quality monitoring proposed to ensure effects on groundwater are no more than minor.

Development of the FEMP and NDA

- 6.142 The development of the FEMP is covered in Dr Robson's evidence and is not repeated here. Dr Robson's evidence also included the applicant's proposed NDA for their property.
- 6.143 According to Dr Bright the key to reducing the nutrient losses to below the NDA is to minimise urine patches in the field, and to minimise the opportunity for phosphorus run-off into water ways. He told us this can be achieved by collecting a substantial proportion of the dung and urine on hard-stand areas, separating the solids from the liquid, storing the solid and liquid effluent until it can be applied to land at a rate that matches plant uptake of nutrients, and applying the effluent to land very uniformly.
- 6.144 Dr Bright explained that centre-pivot irrigators are proposed for applying the liquid effluent because they can achieve high application uniformity, their application depth is adjustable over a very wide range to match the soils capacity to store liquid at the time of irrigation, and they will be in operation for normal irrigation purposes during the pasture growing season.
- 6.145 Separation of liquid from solid effluent minimises the risk of sprinkle nozzle blockage and provides opportunity for any surplus effluent from the farm to be sold off the property as soil conditioner / organic fertiliser. The ability to sell effluent off the property provides an additional practical mitigation option, should monitoring indicate a developing risk of exceeding the NDA.
- 6.146 Sufficient capacity will be provided to store effluent for seven months so that effluent applications can be matched to nitrogen uptake by pasture. Applying nitrogen to pasture at a rate that matches plant uptake of N minimises the availability of nitrate for leaching and thus the risk of nitrate leaching to groundwater.

Groundwater Environment

- 6.147 Dr Bright acknowledged that the proposed irrigation areas on the applicant's property straddle a groundwater flow divide that separates the Wairepo and Quail Burn groundwater sub-catchments. According to him approximately 60% of the proposed irrigated area lies within the Wairepo sub-catchment and the balance in the Quail Burn.
- 6.148 Dr Bright told us that understanding the nature of groundwater flow and of interactions between surface water and groundwater, in both sub-catchments was derived from observations of surface water features, flow paths and measured stream flow rates.
- 6.149 Drainage from the area of Glen Eyrie Downs that is to the north of the DoC Reserve is expected to flow as groundwater through the Wairepo Basin in general alignment with the direction of flow in Wairepo Creek. It then discharges into the Wairepo Arm of Lake Ruataniwha. Dr Bright added that this drainage water is expected to contribute to groundwater flow in the sub-catchment, and not to stream flow on the property or close to the property.
- 6.150 Dr Bright acknowledged that drainage from the area of Glen Eyrie Downs that lies to the south of the DoC Reserve flows south through the Quail Burn sub-catchment to the Ahuriri River basin and ultimately into the Ahuriri Arm of Lake Benmore.
- 6.151 Groundwater and surface water flows from the Quail Burn basin are funnelled through a pass in the Cloud Hills Range and discharge into the Ahuriri sub-catchment according to Dr Bright. He told us that flow gauging showed that the Quail Burn loses about 400 l/s to groundwater in its upper reaches (upstream of Glen Eyrie Downs), but gains about 400 l/s in its mid and lower reaches. He said that drainage water from the area that is proposed to be irrigated and which lies within the Quail Burn sub-catchment is expected to contribute to a gain in surface water flow. Because of this flow gain he added that nutrients draining below the root zone were expected to contribute to flow and nutrient load in the Quail Burn.
- 6.152 The effects on surface water quality of developing all of the proposed irrigated land in the Quail Burn were assessed in the WQS, by modelling, to be no more than minor providing the nutrient discharge from each property was less than the NDA specified for each property. Dr Bright noted that the proposed development on the applicant's property, factoring in the benefits of the proposed mitigation, complies with the NDA specified for it by the WQS.

- 6.153 Dr Bright noted that the observed mean nitrate-nitrogen concentration in the Quail Burn at Hen Burn Road is 0.014 mg/litre, with a range of 0.002 to 0.032. The nitrate-nitrogen concentration for the Quail Burn at mean flow predicted by the WQS modelling is also 0.014 mg/litre, which Dr Bright pointed out was a very good match with the measured values.
- 6.154 However Dr Bright did point out that the flow rate at the time some of the samples were taken was not reported, so the robustness of the comparison is unknown. However he added that given the times of year the samples were taken they probably sample a reasonably wide range of flows and are broadly representative. In Dr Bright's opinion the WQS model is more likely to be overestimating nitrate-nitrogen concentration, and therefore be conservative in its assessment of land-use impacts.
- 6.155 On balance, it was Dr Bright's opinion that the GHD model of surface and groundwater flows in the Quail Burn gives representative results and consequently that full development of the proposed irrigation will result in adverse effects that are no more than minor (providing all applicant properties comply with their NDA).
- 6.156 Dr Bright then outlined what nodes the drainage water from the applicant's property is expected to contribute to. These nodes include: Quail Burn groundwater, Quail Burn surface water, Ahuriri surface water node, Wairepo groundwater (at Wairepo Arm, Lake Ruataniwha), and the Ahuriri Arm of Lake Benmore.

Current groundwater quality

- 6.157 While there is no groundwater quality data for the Quail Burn, measured nitrate-nitrogen concentrations in the neighbouring Hen Burn catchment are 0.55 mg/litre according to Dr Bright. He said that there is currently no irrigation development in the Quail Burn and very little irrigation development in the Hen Burn.
- 6.158 Dr Bright then noted that the WQS modelled nitrate-nitrogen concentration in drainage water on a basin-wide basis, is 1.39 mg/litre. According to him this data indicated that the GHD model may be providing conservative overestimates of the effects of land-use activity on nitrate-nitrogen concentrations in the Quail Burn.

Expected Nutrient Discharge

- 6.159 Dr Bright noted that the proposed irrigation of 2,068 hectares, applying up to 600 mm/year, is expected to generate 325mm of drainage per year on average. The mass of nitrate-nitrogen estimated using OVERSEER to be leached from the farm on an average annual basis is 30,781 kg/year. The average annual nitrate-nitrogen concentration in the drainage water is estimated to be approximately 4.6 mg/litre, assuming that all of the nitrogen from the farm is actually leached from the irrigated area only. Dr Bright noted that this is significantly less than the drinking water standard of 11.3 mg/litre of nitrate-nitrogen which according to him, means shallow bores could be safely used for drinking water supply.
- 6.160 Dr Bright provided the site specific NDA for the applicant's property that has been included in the evidence of Dr Robson and included a table that showed the total N and P discharge from the applicant's farm and thresholds at each node. Dr Bright noted that the most constraining of these thresholds are the Wairepo groundwater threshold for nitrogen (38,139 kg/year) and the Ahuriri Arm of Lake Benmore for phosphorus (1,621 kg/year) which have been used as the applicant's NDA
- 6.161 An OVERSEER assessment of the nutrient losses from the applicant's property, when it is fully developed and managed in accordance with its FEMP, gives average annual nutrient losses of 31,155 kg of Nitrogen per year, and 1,603 kg of phosphorus per year. Dr Bright reiterated that both these loss rates are below the applicant's NDA. According Dr Bright the proposed development of this farm is therefore not expected to generate more than minor adverse effects on downstream water bodies.

Monitoring

- 6.162 Dr Bright referred us to the lysimeters installed on the Lincoln University Dairy Farm. He noted that the 60 lysimeters built and installed to this design have been operating successfully for several years. Dr Bright provided recommendations on how the monitoring should take place and that the total annual measured N leached should be compared with the OVERSEER® estimates of

the average annual N leached. If the actual N leached is greater than the farms NDA then the Dr Bright recommended that:

- (a) A new NDA is calculated by multiplying the current NDA by the ratio of the OVERSEER estimated N leached to the actual N leached.
- (b) The farm management is then revised so that it results in an OVERSEER estimate of N leached that is less than the new NDA.

Aquatic and bird ecology (Dr Greg Ryder)

- 6.163 Dr Gregory Ryder (Director, Ryder Consulting Limited) was engaged by the applicant (and two other applicants for their respective properties) to describe the existing aquatic and avifaunal ecological values associated with both the proposed take and use of water, the ecological effects associated with the irrigation developments and the recommended mitigation options to address these effects.
- 6.164 Dr Ryder told us that he undertook biological surveys of the property area, focusing on the streams in the area, with additional areas also surveyed to assess bird habitat values. He acknowledged that other information on water quality, fish distribution and avifauna had been obtained from a variety of sources and he used this information to aid him in his assessment of potential effects.
- 6.165 He told us that streams through the applicant's property generally meander across flat land amongst rolling hills. Riparian vegetation comprises native and exotic grasses, occasional tussocks, native shrubs and occasional willows. Over most of the area native vegetation has largely been removed through exotic pasture establishment, stock grazing and cropping. Some undeveloped areas remain in places and the most valuable of these have been protected within the DoC Reserve.
- 6.166 Dr Ryder noted that extensive wilding pine growths have been cleared from most of Glen Eyrie Downs, and this has resulted in some modification to watercourses (minor diversions and channel excavation). He added that on-farm watercourses are generally crossed by fords and riparian margins are not fenced off to prevent stock access.
- 6.167 The onfarm streams are generally narrow (channel width range 20-200cm) and shallow (depth range 10-50cm deep, average <30cm) according to Dr Ryder. He added that bed substrate is generally dominated by gravels and small cobbles, with areas of fine sediments and aquatic plants also present in the smaller tributaries where bed sediments are finer.

Water Quality

- 6.168 Dr Ryder referred us to the water quality surveys associated with a wider investigation into the effects of increased irrigation in the upper Waitaki catchment undertaken by Dr Coffey. Dr Ryder noted that he had also recently viewed state of the environment water quality monitoring data from the Council for streams and rivers in the Mackenzie Basin and noted that two of these sites, Quail Burn at Henburn Road and Wairepo Creek at the Pylon Line, are downstream of Glen Eyrie Downs.
- 6.169 According to Dr Ryder results of monitoring the lower end of Wairepo Creek indicate that nitrate concentrations have increased over the last 7-8 years, suggesting that the agricultural or anthropogenic sources have increased in relative importance over this time. He added however, nutrient levels do not indicate levels of high enrichment. Water quality in the wider catchment is likely to be influenced by grazing stock (with open access to surface waters) and fertiliser application, but again the levels of enrichment do not appear to be significant (based on the sampling data available) according to Dr Ryder.
- 6.170 Dr Ryder stated that in contrast to water quality, the physical character of these streams have been highly modified through historic and current farming practices, although he noted that none of the streams within Glen Eyrie Downs are currently subjected to dryland grazing. However, there is evidence of significant channel realignment over time, water diversion (e.g., for stock water races), fords for vehicles and stock, and unprotected riparian margins with ploughing close to the water's edge.

Aquatic Ecology

- 6.171 Macroinvertebrate communities of local streams (Maori Creek, Serpentine Creek, Six Mile Creek and Wairepo Creek) were surveyed by Dr Ryder and Dr Ruth Goldsmith in April 2009. Dr Ryder noted that taxonomic diversity was generally much higher than the New Zealand average of 14 taxa per sample as determined in a nation wide survey by (Quinn and Hickey). He added that approximately 50% of the taxa found were 'pollution sensitive' EPT taxa (mayflies, stoneflies and caddisflies), and included Deleatidium mayflies and Hudsonema and Pycnocentroides caddisflies. The freshwater mussel Hyridella menziesii was also found at some sites. 'Pollution tolerant' oligochaete worms and chironomid midge larvae were also found throughout the area.
- 6.172 Dr Ryder community health index scores were variable and ranged between 'poor' and 'excellent', depending upon the amount of modification to the stream channel and/or the amount of bed sediment present. Overall, he added, the invertebrate communities do not appear to be unique in any way, with communities typical of those widely spread throughout the South Island.
- 6.173 Dr Ryder's sampling showed that SQMCI scores of waterways within Glen Eyrie Downs ranged from 4.5-5.0 (median 4.7) in Six Mile Creek, 3.8 -5.5 (median 5.0) in Wairepo Creek and 3.5 - 6.3 (median 5.3) in Serpentine Creek. He noted that a previous study (Hayward) observed that the median QMCI score at sites classified as 'natural' under the proposed NRRP as being 7.4. Dr Ryder concluded, based on his survey results, that the streams within the applicants property appear ecologically degraded relative to typical streams classified in a 'natural' state.

Fish

- 6.174 Dr Ryder noted that six freshwater fish species have been recorded in Lake Ohau, according to the New Zealand Freshwater Fish Database (NZFFD). Three native species being the longfin eel, koaro and common bully, with three introduced species being brown and rainbow trout and sockeye salmon. None of these fish are rare or uncommon, except for longfin eel, which DOC has classified as in 'Gradual Decline' according to Dr Ryder.
- 6.175 Dr Ryder told us that the NZFFD and his own sampling identified five fish species in waterways within the applicant's property; three of which were native (Canterbury galaxias, koaro and upland bully), and two introduced (brown and rainbow trout). Dr Ryder noted that none of the native fish are included in the latest DoC threatened species lists.
- 6.176 Bignose galaxias, classified by DoC as in 'Gradual Decline', has been recorded from the upper reaches of two creeks, but not within the vicinity of the applicant's property. He noted that Canterbury galaxias, upland bully and brown trout have also been found upstream of the applicant's property, with an additional species, common bully, found in Maori Creek along the proposed irrigation pipeline route.
- 6.177 Overall, in Dr Ryder's opinion, the fish communities in Lake Ohau and in waterways on the applicant's property are not unique in any way. He added that this is probably due to a combination of channel modification, and the presence of trout, which can negatively impact on populations of small native fish species.

Avifauna ecology

- 6.178 An examination of existing information, including Ornithological Society of New Zealand surveys, communication with local DoC workers and sampling by his colleagues found 43 different bird species in the Glen Eyrie Downs area and surrounds according to Dr Ryder.
- 6.179 Dr Ryder noted that fifteen of these species are introduced, with sixteen native and twelve endemic species. He added that species of interest included the black stilt, which is listed by DoC as 'Nationally Critical', the black - fronted tern and Australasian bittern, which are listed as 'Nationally Endangered' and the wrybill, which is listed as 'Nationally Vulnerable'. Dr Ryder added that it is important to note that the above records cover a significantly greater area of land than that occupied by the applicant's property. Consequently, according to Dr Ryder, it is not surprising that a wide range of species has been recorded, and noted that many of these are highly unlikely to be present on pasture land.
- 6.180 Dr Ryder added that most of the bird species on the list are found predominantly in wetland or farmland habitat, with the exception of fantail, grey warbler and silvereye that prefer native bush habitat. The black stilt and wrybill have been found in the protected area of the DoC Reserve.

Effects of Irrigation Application

- 6.181 Given the existing scarcity of woody vegetation within the proposed irrigation area, Dr Ryder stated that any direct effects of irrigation would not adversely affect the habitat of the majority of bird species and particularly rare or endangered species present in the Mackenzie Basin. He noted that the most sensitive and valued habitat within the wider Glen Eyrie Downs area is already protected (the kettle tarns and surrounding land in the DoC Reserve).
- 6.182 Dr Ryder noted that the main species that currently utilise the proposed irrigation area are introduced finches, skylarks, and paradise shelducks. Any irrigation and subsequent pasture and crop production is likely to be beneficial to these species. He told us that irrigating land for pasture production may cause a localised increase in waterfowl such as Canada geese, which can be a problem bird in many areas by fouling waterways and pasture.

Mitigation

- 6.183 Dr Ryder recommended that the unavoidable removal of any large trees, due to constraints associated with the pipeline alignment, should be undertaken in consultation with the DoC. He noted that there is a draft condition of consent which states that excavation shall not occur within 100 metres of birds which are nesting or rearing their young in the bed of the river. He added that this should be extended to include Lake Ohau.
- 6.184 Dr Ryder recommended monitoring of the Canada geese population on irrigation land adjacent to the DoC Reserve and the QEII covenant area. However, he added, as Canada geese are managed as a game bird, consultation with Fish and Game on a suitable monitoring and population management strategy is recommended.
- 6.185 Dr Ryder recommended monitoring of mammalian predators (e.g., cats and stoats) in areas adjacent to the DoC Reserve and the QEII covenant area to assess the potential for prey switching from rabbits to birds. He added that as mammalian predators in the upper Waitaki Basin are already monitored and managed by DoC, consultation with DoC should first be undertaken to determine an appropriate pest management strategy, should one be required.

Potential Effects on Aquatic Ecology

Water Take

- 6.186 The proposed rate of water take from Lake Ohau equates to just 0.5% of the natural annual inflow into the lake. Given this very minor abstraction, Dr Ryder considered it will have no measurable or meaningful effect on the level of Lake Ohau.

Irrigation system

- 6.187 Installation of the proposed irrigation system will require land excavation for pipelines, power lines and other related infrastructure and the construction of access roads and waterway crossings (bridges and culverts). According to Dr Ryder, soil exposure associated with these earthworks has the potential to increase the amount of sediment entering waterways within the irrigation area, either through wind erosion or surface run-off, with potential negative consequences for macroinvertebrate and fish communities in adjacent waterways.
- 6.188 Furthermore, he noted that incorrectly constructed culverts can prevent upstream fish migration. He added that standard best practice design should be employed to ensure culverts do not present a barrier to fish movement. If culverts are correctly installed and maintained, Dr Ryder stated that he was confident that potential effects on fish passage will be avoided. He added that there are a number of guidelines available relating to culvert design and fish passage.
- 6.189 In his opinion the loss of aquatic habitat can be countered by improving remaining stream habitat by protecting riparian margins.

Irrigation application

- 6.190 The irrigation development will result in an increase in stock densities and potential diversification into more intensive farming practices according to Dr Ryder. He acknowledged that with increased intensification comes the potential for greater contaminant (e.g., faecal micro-organisms, nutrients, sediments, oxygen demanding substances) losses to ground and surface

waters than currently occurs, with potential negative effects on water quality and aquatic biota. In Dr Ryder's opinion nutrients are probably the contaminants of greatest concern.

- 6.191 The greatest potential pathway for phosphorus to enter waterways is through the surface run-off of water, with wind erosion also a problem in the upper Waitaki Basin (see evidence of Dr Painter in Part A). He added, like phosphorus, nitrogen can also be lost from the land and enter waterways through point sources and incidental losses. However, the primary pathway through which nitrogen enters waterways is through leaching. He told us that streams, rivers and lakes have a natural capacity to assimilate the effects of additional nutrient loss without any adverse environmental impact, with the magnitude of this capacity varying from catchment to catchment.
- 6.192 Dr Ryder noted the GHD study that recommended environmental nutrient thresholds for the applicant's property. He noted that these thresholds set the level at or above that which the ecological response to increased nutrients would generate potentially more than minor adverse effects relative to current conditions (based on a 25% increase in periphyton).
- 6.193 In Dr Ryder's opinion such an approach is reasonable given the existing status of local waterways and the likely ecological effects of an increase in periphyton biomass in these waterbodies. He noted that a 25% increase in maximum periphyton biomass over existing levels would be unlikely to result in significant changes to the macroinvertebrate and fish communities in these particular streams.
- 6.194 Specific to the applicant's property Dr Ryder considered that such an increase is unlikely given: the low gradient land resulting in little surface runoff; the proposal to have a minimum of 5 metre wide riparian buffers; the low potential for groundwater inflows to these streams within the property boundaries; and the potential to create significant north sided shading through riparian protection and appropriate planting.
- 6.195 Dr Ryder noted that GHD's study predicted increases in groundwater nutrient concentrations in the Wairepo sub-catchment would adversely impact on the water quality of the Wairepo Arm of Lake Ruataniwha, which currently is in a mesotrophic state. Dr Ryder added that on-farm mitigation has been recommended in the form of restricting nitrogen losses to 16.4 kg N/ha and phosphorus losses to 0.7 kg P/ha for all new irrigation in this catchment to prevent a shift in water quality for this water body.
- 6.196 Serpentine Creek (that flows through the applicant's irrigation area) drains to the Quail Burn, which drains to the Ahuriri Arm of Lake Benmore via the Ahuriri River. Dr Ryder noted that GHD's study recommended that the Ahuriri Arm of Lake Benmore be maintained in its current oligotrophic state. For this to occur, nutrient losses must be reduced by 10.7 kg N and 1.1 kg P for every hectare of proposed or renewed irrigation in the catchments that drains into this catchment. Dr Ryder acknowledged that on farm mitigation measures are therefore required for proposed irrigation within this catchment as he detailed below.

Recommended Aquatic Mitigation

Water quality

- 6.197 Dr Ryder told us that a farm environmental risk assessment (FERA) for the applicant's property noted there are potential risks of runoff from grazed areas reaching watercourses, stock access to watercourses and the grazing of stock over winter. Nutrient thresholds have been developed for the farm to ensure that inputs of nitrogen and phosphorus to waterways do not result in potentially significant adverse effects to local streams and receiving lakes.
- 6.198 Nutrient management and mitigation approaches have been developed to achieve these thresholds and include the housing of stock for much of the year using a 'cubicle stable' system, separation of clean and dirty water in yards, seven months of effluent storage in a lined facility, carefully managed effluent application to land, fertiliser management procedures, well-designed irrigation systems, and establishment of fenced riparian buffer zones.

Riparian management

- 6.199 Dr Ryder noted that aquatic communities in some streams have been affected by disturbance in upstream areas and by the existing lack of widespread riparian management. There is, therefore in his opinion, significant opportunity for enhancement of some waterways through appropriate riparian management.

- 6.200 Dr Ryder added that by maintaining a barrier of dense riparian vegetation reduces the potential for contaminants to directly enter waterways and in addition vegetation can shade the waterway (and in doing so reduce water temperatures and restrict weed growth), provide cover and habitat for fish and invertebrates, and stabilise banks. Dr Ryder recommended that 5m riparian setbacks be used for all waterways on the applicant's property. He noted that this approach is consistent with the Council's riparian management guidelines.
- 6.201 Provided these measures are undertaken, Dr Ryder expected changes to water quality to be acceptable and effects of the proposed Glen Eyrie Downs development on local aquatic ecosystems to be no more than minor. He added that he expected a significant improvement to the physical character of these streams, which should benefit local fish and macroinvertebrate communities.

Terrestrial Ecology (Dr Ruth Bartlett)

- 6.202 Dr Bartlett provided a description of the applicant's property and proposed irrigation. Her evidence included a description of the watercourses that run through the property and the proposed farming systems (cubicle dairying).

Description of Vegetation

- 6.203 Dr Bartlett noted that the applicant's property is currently being managed as an arable cropping unit, supplying a biodiesel initiative. She added that until 2006 the property was almost completely covered in wilding pine. She explained that the vast majority of these pines have been removed and the land has been ripped, raked and seeded to allow crop production. Dr Bartlett noted that the areas visited during her site visit had very limited indigenous species presence, but in some areas there was scattered fescue tussock, small native grasses such as *Deyeuxia avenacea*, and small herbs and sub-shrubs such as *Gonocarpus micranthus*, *Geranium sessiliflorum* and *Leucopogon fraseri* present.
- 6.204 Dr Bartlett told us that the pine infestation, its removal and the development of the land for cropping, means that the vast majority of the property has very limited ecological value.

Wairepo Kettleholes Conservation Area and Wairepo Creek

- 6.205 Dr Bartlett noted that in the centre of the property is the 400 ha DoC Reserve, which was established in 2004 when Glen Eyrie Downs station completed its tenure review process. Dr Bartlett explained that this reserve comprises tussock grassland and shrubland around some large ephemeral tarns or "kettleholes" and a large area of red tussock grassland bordering Wairepo Creek along its northern boundaries.
- 6.206 Dr Bartlett told us that there were remnant patches of red tussock along the margins of a drainage channel adjacent to Wairepo Creek to the northwest of the reserve. She said that this area was part of the RAP but has been recently cultivated, which has reduced its ecological values. Dr Bartlett added that these values are also represented within the DoC Reserve.
- 6.207 East of the DoC Reserve the Wairepo Creek crosses the applicant's property to its boundary with Ohau Downs. According to Dr Bartlett the stream's margins supports scattered fescue tussock and scattered matagouri amongst exotic grasses, primarily brown top (*Agrostis capillaris*) and sweet vernal (*Anthoxanthum odoratum*) with sheep's sorrel (*Acetosa acetosella*) and hawkweed.

Serpentine Creek

- 6.208 Serpentine Creek meanders through the lowest-lying part of a valley at the north western end of the applicant's property (Figure 1). Dr Bartlett noted that pines grew along the wetland margins and were scattered within it but that during the removal of the pines, debris piles were scraped together and some of these remain within the wetland area. Dr Bartlett stated that this area was identified as a 'RAP'.
- 6.209 Dr Bartlett noted that Browntop and other exotic grasses dominate the low-lying areas near the stream but the ephemeral wetlands along the stream and the riparian margins support scattered red tussock, fescue tussock, swards of *Carex coriacea*, Chewings fescue (*Festuca rubra*) and occasional toetoe along with herbs such as the exotic *Stellaria graminea*, and native *Gonocarpus micranthus*, and scattered rushes. Dr Bartlett noted that approximately half of the valley floor is dry and parts of it have been cultivated.

Six Mile Creek Tributaries

6.210 Dr Bartlett noted that the northern most of the two tributaries lies on the edge of the land that was cleared of pines. She added that the creek has a defined channel with a vegetation cover of red tussock, *Carex coriacea*, exotic grasses including Yorkshire fog, cocksfoot and browntop, and *Juncus* species along with pines, golden Spaniard (*Aciphylla aurea*) and small herbaceous species including *Ranunculus amphitrichus*, *Oreomyrrhis ramosa* and *Pratia angulata*. The southern of the two tributaries does not have a formed channel but is within the cultivated area and does not support indigenous vegetation according to Dr Bartlett.

Ecological Values

6.211 Most of the Glen Eyrie Downs irrigation command area cannot be considered 'significant' according to Dr Bartlett's assessment criteria. She added that it is almost entirely under cultivation and this large scale modification has resulted in very limited indigenous vegetation cover. Dr Bartlett noted there were a number of exceptions to this including Wairepo Creek margins and the upper part of the Serpentine Creek, which is recognised in its RAP status. Dr Bartlett then outlined the proposed buffer for Serpentine Creek and its tributaries and how this buffer will be managed.

Proposed Mitigation

6.212 Dr Bartlett recommended that low growing grasses, tussocks and sedges should be planted nearest the stream edge, and mixed tussocks, shrubs and trees along the outer half of the buffer zone for this purpose. The species to be planted would be selected from those present in the Ecological District that can be expected to provide habitat as well as contributing the nutrient stripping qualities required according to Dr Bartlett.

Wairepo Creek

6.213 In the north-western portion of Wairepo Stream, a channel has been formed along the boundary fence and the ground cultivated, removing an area of red tussock wetland that was previously present according to Dr Bartlett. She added that this is in an area that was designated as a RAP by Espie et al. (1984). To remedy the effects of these previous earthworks on the stream channel and red tussock wetland Dr Bartlett noted that the applicant proposed to reinstate the wetland.

Serpentine Creek

6.214 Dr Bartlett outlined recommended planting on a narrow batter between the Serpentine Creek and the adjacent road which she noted may also be used as a cattle lane. She noted that the cattle lane will be formed so that runoff will drain to the east and not into the creek.

6.215 Dr Bartlett outlined the proposed works downstream where the road diverges from the creek and boundary fence. She stated that a series of wide shallow depressions will be excavated and the stream directed to them. These depressions will form a meandering pattern and flood in times of heavy rainfall to interrupt and slow the stream flow through this area. She added that the stream will be fenced five metres from the edge of the nearest meander.

6.216 Dr Bartlett said that this area will be planted with red tussock (with associated *Carex* and *Juncus* species around any particularly deep or wet areas) but shrub and tree species will be planted nearest the fence to assist with nutrient removal. Furthermore the planted area will be over sown with browntop to allow it to establish a rapid vegetation cover, minimising sediment generation and weed establishment (particularly *Hieracium*).

6.217 Dr Bartlett noted that the meandering nature of the creek means that it is probably impractical to follow the line of the creek. Consequently, Dr Bartlett provided a diagram to illustrate how the creek could be fenced without the need to mimic every meander. Dr Bartlett reiterated that the clearing of pine trees has left debris piles along the stream and disturbed the vegetation. She added that the mitigation proposal includes reinstating the surface and replanting the area as part of the works.

Six Mile Creek Tributaries

6.218 The applicant proposes to retire a 5 m buffer along the northernmost of the Six Mile Creek tributaries and to plant it in a similar manner to Wairepo and Serpentine Creeks according to Dr

Bartlett. She added that during the removal of pines the ground along the southern edge of this tributary was disturbed by machinery and this will be recontoured prior to planting.

Irrigation Area

6.219 Dr Bartlett told us that irrigation of the applicant's property can be expected to result in the loss of the remnant indigenous species that may have survived cultivation, and will result in the further development of an exotic grassland cover. She added that the return of vegetation to this land will have the benefit of providing a more intact cover that will help bind soil and prevent its loss. In areas where irrigators will come close to watercourses, such as Serpentine Creek, there may be limited seepage or throughflow that may assist in the regeneration towards a riparian cover dominated by indigenous species according to Dr Bartlett.

Monitoring

6.220 Dr Bartlett stated that for the buffer areas along the Serpentine and Wairepo Creeks and the northern tributary of Six Mile Creek, the vegetation planted should be monitored to ensure that mortality is less than 10% over the first year. If necessary remedial planting can be undertaken to achieve the desired nutrient removal. She added that monitoring for woody weeds like pines, gorse and broom would also be carried out.

6.221 Dr Bartlett made a number of recommendations for monitoring that included: A check on the vegetation planted after three months to ensure there had not been wholesale mortality; six monthly checks along the length of the creek for woody weed species (gorse, broom and pines) and removal of these as necessary. After a full vegetation cover has established, or it is clear that woody weeds are not being found in significant numbers Dr Bartlett suggested that such monitoring could be carried out less frequently (annually or biannually); and regular checks to ensure the fence remains stock proof.

Cultural (Buddy Mikaere)

6.222 Buddy Mikaere (Principal, Buddy Mikaere and Associates) appeared on behalf the applicant (as well as Five Rivers Ltd, WHL Killermont, and Killermont Station). He stated that the objective of his evidence was to show how the cultural issues that have been raised in opposing the applications for irrigation in the Mackenzie Basin by Te Runanga O Ngai Tahu (TRONT) and the Ngai Tahu Mamoe Fisher People Incorporated have been addressed.

6.223 Mr Mikaere has considered all the applications and his assessment is that provided the suggested mitigation proposals are put in place by way of appropriate consent conditions and incorporated into the respective FEMPs then the overall impact on cultural values of the proposed irrigation and associated infrastructure will be less than minor.

6.224 Sections 6(e), 7(a) and 8 of Part 2 of the RMA are normally regarded as the 'cultural' sections according to Mr Mikaere. In his view the applicant is in compliance with these sections of the RMA. Mr Mikaere then provided details on how he believed these applications are compliant with these sections. Mr Mikaere then outlined the relevant 'cultural' policies and objectives from the WCWARP and in summary noted the applicants proposed activities are consistent with these policies and objectives.

6.225 While we have considered Mr Mikaere's evidence in full, it is discussed further in that section of our Part A decision dealing with tangata whenua values.

Farm Environmental Management Plan (Dr Melissa Robson)

6.226 Dr Melissa Robson (Environmental Scientist, Ryder Consulting Limited) presented evidence on the applicant's Farm Environmental Management Plan (FEMP). Only evidence specific to the applicant's property and proposed irrigation is considered in this section. Similarly information on waterbodies within the applicant's property and groundwater flow is covered in other experts' evidence.

6.227 For the applicant's property Dr Robson noted that the N mitigation requirements are the most stringent for Wairepo (stated as simply 'groundwater' by Dr Robson but Table 1a of the FEMP makes it clear it is the Wairepo groundwater sub-catchment) groundwater and the P mitigation requirements are most stringent for Ahuriri Arm. These mitigation requirements set the applicant's nutrient discharge allowance at 38,139 kg N per annum and 1,621 kg P per annum. On a per hectare basis over the entire farm, this gives an N loss of approximately 14 kg/ha and a

P loss of approximately 0.7 kg/ha. Dr Robson noted that these losses are less than half of the range quoted for typical dairy farms in New Zealand of 30-50 kg N/ha and 3-5 kg P/ha.

- 6.228 At a highly developed setting, the modelled N losses increase to 58,042 kg N. As this setting allows for no immobilisation of N, the losses become highly sensitive to inputs according to Dr Robson. Consequently, she added, an increase in the length of time dairy cows are housed and a reduction in N fertiliser inputs is likely to deliver the required reduction. Dr Robson provided an example by stating that just a reduction in the inorganic fertiliser N input from 130 kg N/ha to 103 kg N/ha delivered the required reduction in N losses (total farm N loss at 37,631 kg/year).
- 6.229 Dr Robson provided an overview of the applicant's proposed farm system including a brief description of the proposed production, effluent handling, fertiliser and water (irrigation) use. She then provided the details of the FEMP for Glen Eyrie Downs including the monitoring and audit plans.

Amendment to the FEMP

- 6.230 On the 9 March 2010 the applicant provided an amendment to their FEMP. This amendment introduced four new proposed farming systems in addition to that already proposed (dairy cubicles). The new systems, as explained by Dr Robson, include:
- (a) Cut and Carry - an irrigated cut and carry system with a small area of arable cropping grown during pasture renewal. Stock are housed off site and in general do not graze on the station. The exception is a light spring grazing of triticale during pasture renewal. Pasture will be cut, conserved and exported to the herd (off farm) throughout the year. 210 ha will be under arable pasture renewal and the remaining land will be under pasture with cut and carry management.
 - (b) Sheep and Beef - an irrigated sheep and beef finishing enterprise (970 ha) with an area of cut and carry (888 ha) and a small area of arable cropping undertaken during pasture renewal (210 ha). At a Highly Developed setting the area of sheep and beef would decrease to 550 ha and the area of cut and carry would increase to 1,308.
 - (c) Mixed Farm - with a dairy herd (460 ha), a sheep and beef finishing enterprise (510 ha), an area of cut and carry for the production of supplements (888 ha) and a small arable rotation for the pasture renewal phase (210 ha). At a Highly Developed setting the area of sheep and beef would decrease to 290 ha and the area of cut and carry would increase to 1,108 ha.
 - (d) Conventional Dairy - that would include a wintering off dairy enterprise, (so no dairy cows on paddocks during winter months) with a dairy herd (1,425 ha) and an area of cut and carry for the production of supplements (643 ha).
- 6.231 Under the developed setting of OVERSEER all the new proposed systems met the required NDA for the applicant's property. As noted above under the Highly Developed setting, Sheep and Beef and Mixed Farm systems were unable to meet the NDA for Nitrogen and the system has been modified (from that modelled under the Developed setting) to ensure compliance with the NDA.

Response to S92 request

- 6.232 In her additional evidence dated 9 March 2010 Ms Robson also provided a synopsis of the further information requested by the Council under Section 92 of the RMA. This response was in regard to effluent management, which while strictly relating to the 'called-in' effluent consents, is also relevant to our understanding and decision on the total nutrient load leaving the property as a result of exercising this take and use consent.
- 6.233 One of the main issues vexing the Council experts assessing this application in combination with the other dairy applications (Southdown holdings, WHL Killermont) was the apparent difference in N loading in effluent. Dr Robson explained that the effluent N concentration used is calculated internally within OVERSEER and is a function of variables such as the number of stock, the housing, whether solids are separated, and the type and quantity of supplements, all of which were farmer-supplied.
- 6.234 Dr Robson also clarified that any N reductions achieved by riparian buffer strips/wetlands were not included within assessments of whether individual properties would meet their thresholds,

and that in fact no mitigation measures that could not be modelled within OVERSEER were included within such assessments.

- 6.235 Dr Robson stated that the applicant proposed to apply effluent to 2,068 ha of Glen Eyrie Downs, which is 97% of the applicant's property.
- 6.236 In response to a question on how the applicants proposed to ensure that effluent cannot be irrigated into, or immediately adjacent to streams Dr Robson replied that solenoid valves were originally proposed, however this has now been changed so that none of the centre-pivot irrigators used to irrigate effluent will cross streams. Liquid effluent will be applied by tanker in those paddocks that have streams running through the pivot circles. And a 20 m layback will be observed for effluent spreading from all watercourses.

7 SUBMITTERS

- 7.1 We note that most of the submissions against the granting of large-scale dairy applications (of which this proposal is one) were aired as generic opposition to the cumulative water quality effects of granting. As such, it has been summarised in Part A and will not be repeated here. However we consider all the Part A evidence along with the specific submissions to this application in our consideration of the issues. We also note that we have considered the submission of the Blue Family Trust in the decision on the land use application (CRC040836).
- 7.2 Although the summary that follows is not strictly in the order that the submitters appeared, we firstly cover the submitters who appeared in support of the application, followed by those who either oppose the application or wish to see conditions attached if consent was to be granted.

Submission in Support - T & J Cooke

- 7.3 Mr Terence and Mrs Josephine Cooke provided a written submission in support of the applicant. They noted that the proposal will enable potential fertile land to be converted into highly productive grassland of multiple users. They recommended that we grant the consent otherwise the land will continue to revert to Wilding Pine and be a natural habitat for rabbits and other pests.

Groundwater and water quality - Peter Callander MEL

- 7.4 Mr Callander presented three briefs of evidence at the hearing on behalf of MEL, a general brief, a brief on cumulative water quality effects and one on individual applications. The following information has been compiled from his 'individual applications' brief of evidence. In this evidence Mr Callander commented on Dr Bright's evidence in relation to the applicant's property as well as three other properties in this applicant group.
- 7.5 Mr Callander told us that the groundwater sub-catchments beneath the applicant's property are the Quail Burn and Wairepo. He said that the partitioning of soil drainage water and groundwater flow into each of the groundwater sub-catchments has been determined by the applicant from observations of surface flow patterns and from the groundwater flow model that was developed as part of the MWRL groundwater assessment.
- 7.6 In Mr Callander's opinion there is a large degree of uncertainty associated with how that partitioning of water into each sub-catchment has been carried out due to the lack of data with which to calibrate the groundwater model.
- 7.7 He referred us to a figure in his evidence that showed the bores used to calibrate the water levels for the groundwater flow model. He noted that there is no information available for the Quail Burn and Wairepo groundwater catchments. He concluded that in such areas (where no water level data is available) that there has been no calibration of the groundwater flow patterns. Consequently, the partitioning of drainage water from farms into the groundwater sub-catchments can only be defined with a large degree of uncertainty. Mr Callander added that similarly, the information on current groundwater quality conditions is not well defined.
- 7.8 Mr Callander then noted the conclusion reached by Dr Bright regarding the mitigation of nutrients from the applicant's property and to which nodes the farm is likely to contribute to. These are split into North of DoC Reserve (Wairepo Arm of Lake Ruataniwha via groundwater) and South of DoC Reserve (Quail Burn in its mid and lower reaches via surface water).

- 7.9 For the three main groundwater catchments that Dr Bright has considered to be affected by several properties in this area Mr Callander used information provided by the applicant to tabulate the changes in nitrogen mass from existing irrigation to the proposed future irrigation scenario.
- 7.10 For the Wairepo Creek catchment (of which part of the applicant's property is within) Mr Callander calculations demonstrated an increase of nitrogen draining through the soils, as result of all the proposed irrigation, would be from 58,551 kg to 157,602 kg of which he noted, the large majority, has been assumed to discharge via groundwater. Consequently, he added that it is important to understand the final destination of this groundwater.
- 7.11 For the Quail Burn catchment (of which part of the applicant's property is within) his calculations demonstrated an increase of nitrogen draining through the soils from 24,024 to 30,406 kg from all the proposed irrigation in this catchment. Mr Callander added that the Quail Burn catchment is an example of where denitrification has been used by the applicant/MWRL to remove a large proportion (80%) of the additional N generated from the increased irrigation. Mr Callander added that this is a non-conservative assessment because the effectiveness and significance of this process in the Mackenzie environment is not know.n
- 7.12 Mr Callander acknowledged that MWRL consultants have advised him that that the information he was provided with to undertake his calculations of increased nitrogen do not include the effects of the proposed mitigation measures.
- 7.13 Mr Callander noted that Dr Bright's evidence does not provide any detail about phosphorus (P) migration. He explained that it was his understanding that the P losses from soil were assumed to go into surface waterways, but have been scaled back to match the sampled surface water concentrations.
- 7.14 In Mr Callander's opinion it would be helpful to more clearly understand the migration pathway process, and that the P generated from each farm was clearly stated, along with the degree of scaling back for input to surface waterways. He would have also expected a description of the fate and transport of the residual P that does not enter the surface waterways.
- 7.15 Regarding the fate of the groundwater Mr Callander stated that assuming there is even groundwater flow across the downstream end of the Wairepo catchment, a simple comparison of the cross-sectional areas would indicate that at least 40% of the groundwater flow could enter the Wairepo Arm. This would correspond to around 23,000 kg of N at present and 62,000 kg of N under MWRL's proposed scenario. Mr Callander added that based on the topographic map (provided in his evidence) he would expect most of the nutrients entering Wairepo Arm would flow into the Ohau C Canal. He reiterated that increased nutrients in the Canal are of concern to MEL.
- 7.16 Mr Callander considered that Dr Bright's evidence presents a generalised description of a possible migration of nutrients that has been provided to Dr Bright by GHD. In Mr Callander's view however, Dr Bright did not appear to have critically reviewed that information and not described the uncertainties associated with it. Mr Callander provided a description of the uncertainties, which in his view lessen the confidence we should place on their assessment. This summary of uncertainties has been noted.
- 7.17 Mr Callander acknowledged that these uncertainties are largely due to a lack of reliable field data rather than any basic errors in the assessments. However, due to that lack of data he added that it would be appropriate to present either a conservative analysis (which is not the current MWRL approach) or a sensitivity analysis to consider a range of possible nutrient generation and migration scenarios that could arise within the constraints of the information available.
- 7.18 Mr Callander acknowledged that the MWRL summary report identifies that nutrient reductions are required for no change in trophic state in the Wairepo Arm, Kellands Pond and the Ahuriri Arm of Lake Benmore. Mr Callander then identified a number of uncertainties in achieving a reduction in nutrient input that included how on-site mitigation methods will be controlled and monitored, and the inaccuracies (in his view) regarding nutrient input and dilution in the Wairepo Arm.
- 7.19 Based on the information he had available to him Mr Callander could not conclude that the Southdown Holdings Ltd Glen Eyrie Downs irrigation activity will not ultimately contribute to an increase in nutrient load to the Wairepo Arm of Lake Ruataniwha and the Ahuriri Arm of Lake Benmore.

Landscape and terrestrial ecology

Di Lucas (Mackenzie Guardians)

- 7.20 Ms Di Lucas provided site specific information on the applicant's property. In her evidence she split the proposed irrigation area into three distinct areas. The most northern area Ms Lucas identified (Site 24 in her maps attached to her evidence) relates to the area of Sheldon Downs that the applicant originally applied to irrigate but has subsequently removed from its proposal. Consequently, we have chosen not to consider Ms Lucas' comments for this specific area.
- 7.21 The remaining sites in Ms Lucas' evidence (Sites 25 and 26) were grouped with Site 27 (Marie Horo application). On these sites Ms Lucas noted that they are mostly developed as cultivated dryland. She added that they adjoin the Wairepo Kettleholes Conservation Area (DoC Reserve) and the Wairepo Creek. In her opinion irrigation would intensify the effects on natural landscape values.
- 7.22 She noted that due to the important moraine lands, Mr Glasson had recommended Site 25 (north of the DoC Reserve) be declined. Ms Lucas agreed with Mr Glasson and added that she also considered the other sites to be inappropriate.

Dr Susan Walker (Landcare Research Ltd for Mackenzie Guardians)

- 7.23 In her site specific evidence Dr Walker noted that the potential effects on biodiversity are moderate and added that a tenure review has been undertaken and the values mapped. She added that the proposed irrigation site does not overlap significant inherent values identified in the tenure review but is adjacent to wetland recommended areas of protection (RAPs). Her Appendix 15 set out site specific matters for us to consider. We note we have referred to her evidence in Part A.

Aquatic Ecology

- 7.24 As noted in the introduction to this section, there was no specific evidence by submitters in relation to aquatic ecology aspects of this application. However we note that Dr Snelder and Ms Sutherland provided comprehensive evidence on aquatic ecology in opposition to the cumulative effects aspects of this application, particularly with respect to the Wairepo Arm of Lake Ruataniwha, and the Ahuriri Arm of Lake Benmore. This evidence is covered in Part A and we capture the relevant points in our S104 evaluation.

Cultural (Ngai Tahu)

- 7.25 While Ngai Tahu did not make a specific submission in relation to Glen Eyrie Downs (Southdown) they did submit in opposition to all applications at this hearing. They later qualified that opposition (in a memorandum in relation to Simons Hill/Simons Pass stations) saying they remained formally opposed to dairying applications.
- 7.26 Ngai Tahu witnesses made specific reference to, or alluded to, Southdown in their evidence opposing all applications including:
- 7.27 Ngai Tahu were concerned with the sheer scale of some of the applications, particularly those draining to sites identified for enhancement of mahinga kai. Ngai Tahu did not want to see new irrigation that will degrade existing habitats and deny opportunities for enhancements in the Ahuriri Delta and Haldon Arm.
- 7.28 Ngai Tahu were alarmed about the scale and intensity of the larger proposals such as Southdown, Five Rivers, Killermont, Simons Hill, Simons Pass and the two Rosehip applications. Mr Horgan urged that given the patchy nature of the science presented in the proposals that a precautionary approach be adopted, he stated that the 'suck and see' approach that the applicants are seeking is cavalier and inconsistent with the special relationship that Ngai Tahu hold with the Upper Waitaki.
- 7.29 In relation to the applicant's proposed adaptive management plan Mr Horgan (for Ngai Tahu) stated:

"Simply reducing the annual allocation of water for the subsequent season as proposed in the evidence of John Kyle for Southdown, Williamson Holdings, Five Rivers and Killermont

Station would not be sufficient to address degraded water problems and the lag effect of accumulated nutrient levels migrating through the gravels and into the groundwater."

- 7.30 We discuss cultural evidence in relation to all applications in Part A. Points made in those submissions of relevance to Southdown are captured in our S104 evaluation.

Other issues

- 7.31 In addition to the above, we also received evidence from Ms Devon Christensen on behalf of Fish and Game raising issues in respect of the FEMPs. Also we received evidence from Dr Helen Brookes on behalf of Waitaki First raising issues of concern relating to centre pivot irrigators applying effluent while crossing streams. Both of these matters are discussed subsequently when we consider Dr Robson's views in relation to the FEMPs.
- 7.32 We also receive evidence from Mr Mark Webb on behalf of Fish & Game, Mr Maturin and Ms Anna Cameron on behalf of the royal Forest and Bird Protection Society. Points they made in evidence are discussed in detail where we record Dr Bartlett's right of reply.

8 UPDATES TO THE SECTION 42A REPORTS

Other Water Users

- 8.1 In her S42A addendum Ms Penman noted that the applicant had provided an assessment of the effects of the proposed abstraction on other users and activities. She considered that as derogation approval has been received from MEL, who would be the primary affected party, that this matter has been adequately dealt with. However, she did note that granting this consent over the allocation limit may have a precedent effect as the WCWARP is an operative plan.

OVERSEER auditing

- 8.2 Mr McNae (Section 42A Officer for OVERSEER auditing) identified a number of inputs used in the OVERSEER model for the applicant's property that required clarification in order to confirm the validity of the results. Of highest concerns identified by Mr McNae were the use of only the developed setting, the low clover content, within the irrigated pasture, and the high reliance on herd homes (cubicle barns) and feed pads.
- 8.3 In his addendum Mr McNae acknowledged that he had received a reply from the applicant regarding the issues he identified. However, he noted a number of issues were still outstanding in his opinion including, low clover content and the effluent being exported from the system.
- 8.4 Regarding clover content Mr McNae accepted that it is likely that the clover content of the applicant's farm may be low. However, he recommended strict monitoring of the actual cover for feed back into the OVERSEER modelling. Regarding the exported effluent Mr McNae accepted the applicant's reply but added that being able to account for all the nutrient inputs in the catchment may be crucial, especially in a sensitive catchment such as the Ahuriri Arm.

Cumulative Effects

- 8.5 In her S42A addendum Ms Penman noted that the FEMP and water quality assessment provided by Dr Bright, Dr Robson and MWRL had been audited by the Council's technical experts (see Dr Freeman's addendum). She added that they consider that, for the area of the property within the Ahuriri Arm catchment, there is a high level of uncertainty about potential adverse effects, and given the scale of the development and potential consequences of those adverse effects, this application should not be granted.
- 8.6 Ms Penman noted that for the area of the property within the Wairepo catchment, the Council's technical experts considered that there are some uncertainties about the potential adverse effects and suggest that either more information is needed or strict monitoring and response conditions would be needed to address cumulative water quality effects. In her S42A addendum Ms Penman also added that to date, no appropriate conditions addressing water quality on a local or cumulative scale have been proposed by the applicant.

Landscape Effects

- 8.7 In her S42A addendum Ms Penman noted that Mr Glasson had reviewed the evidence of Mr Stephen Brown, but remains of the opinion that a buffer is required from Quail Burn Road, Serpentine Creek, Wairepo Creek and the DoC Reserve, as well the removal of south-western pivots, in order for effects to be acceptable.
- 8.8 In regards to the proposed cubicle sheds Mr Glasson commented that they will have a very high visual impact when viewed from Ohau Road. He added that this is a very sensitive landscape and he is of the opinion that the sheds will detract from the identity of the location and should be declined consent.
- 8.9 As the conclusions reached by Mr Glasson considered the effects may be more than minor, Ms Penman was not satisfied that the adverse effects on people, community and amenity values, in terms of effects on landscape as a result of irrigation, will be minor.

Terrestrial Ecosystems

- 8.10 In her S42A addendum Ms Penman noted that the applicant had provided a detailed assessment. However as this assessment contradicts with Dr Walker's assessment (submitter for Mackenzie Guardians), Ms Penman was unable to conclude that the effects on terrestrial ecosystems are acceptable.

Aquatic Ecosystems

- 8.11 Ms Penman noted that conditions recommended by Dr Ryder in regards to effects on avifauna have not been included in the applicant's proposed conditions/mitigation. If these aspects are addressed in the consent conditions, Ms Penman would be satisfied that effects on aquatic ecosystems and avifauna would no longer be a concern.

Efficient and Reasonable Use

- 8.12 As part of their evidence the applicant provided an alternative comparison for determining the efficiency of their proposed take using the Irricalc model (refer to Mr McIndoe's evidence). In regards to this Ms Penman added that provided a favourable comparison of the Irricalc input parameters against field measurements is undertaken prior to granting of consent, she would be satisfied that the proposed volume is reasonable for the property, and therefore, efficient and reasonable use would no longer be a concern.

Cultural

- 8.13 In her S42A addendum Ms Penman acknowledged the assessment provided by Mr Mikaere on behalf of the applicant regarding the effects on cultural values. However, because at the time of writing her addendum she had yet to hear the submission from Ngai Tahu, she was unable to determine the potential effects on cultural values.

9 APPLICANT'S RIGHT OF REPLY

Closing legal arguments (Mr Whata)

- 9.1 Mr Whata provided the closing legal submission on behalf of the applicant and the three other applicants in this grouping. In his overview he stated that the final officer recommendations have lost sight of the big picture, and more particularly a realistic appraisal of the adverse and positive effects of the proposed farming systems
- 9.2 He addressed us on the existing and future environment reminding us that the applicant's site was not a pristine natural environment and reflects the reality of a dryland farming tough environment. He discussed with us outstanding issues, including water quality issues, cultural issues, and landscape issues, which we discuss in more detail below.
- 9.3 Specific arguments he raised in relation to this application were as follows:
- (a) The proposed abstraction from Lake Ohau for irrigation Glen Eyrie will result in a de minimis effect on the lake (abstraction 0.5% of annual natural inflows).

- (b) No serious consideration has been given by the S42A Officers to the counterfactual, and a return for example, to more than a 1000 hectares of wilding pines on Glen Eyrie.
- (c) The applicant has accepted the recommendations by Mr Brown to undertake mitigation on Glen Eyrie through painting of cubicle barns mid-dark matt grey approximately 10% darker in tone than the surrounding land cover.

9.4 Mr Whata also discussed effluent management issues and addressed us in detail in respect of adaptive management, including lock-step, staging, and ratcheting, which we discuss in greater detail later within this Decision.

Landscape (Mr Stephen Brown)

- 9.5 Mr Brown's right of reply responded to the matters raised in the supplementary report of Mr Glasson. The first part of Mr Brown's evidence responded to the general status of Mr Glasson's comments and have been incorporated into the discussion on landscapes in Part A of this decision. The second part of Mr Brown's evidence focuses on the concerns and recommendations raised by Mr Glasson in relation to the individual properties including the applicant's property.
- 9.6 Mr Brown noted that Mr Glasson stated that buffering is needed around the Wairepo Creek and DoC Reserve. Mr Brown rebutted by stating that the DoC Reserve is primarily a biophysical entity, rather than being valuable in a visual or perceptual sense. He added that this is accentuated by the physical isolation of the DoC Reserve relative to virtually all of the public domain.
- 9.7 Mr Brown acknowledged that Mr Glasson refers the DoC Reserve as having 'recreational value', but in his opinion it is difficult to determine what this might be, apart from bird watching (possibly). Mr Brown noted that the rest of the Wairepo Creek corridor, which displays even less landscape value per se and is virtually imperceptible from Lake Ohau Rd, would be physically protected from the proposed irrigation system and cubicle barns.
- 9.8 In relation to the proposed cubicle barns, Mr Brown noted that Mr Glasson stated that they will have a very high impact when viewed from Lake Ohau Rd. In Mr Brown's opinion they would be viewed over distances of 4km or more and would have a low-slung, horizontal profile that mimics the natural lie of the land and would become minor components of the wider rural landscape exposed to Lake Ohau Rd.
- 9.9 Regarding buffering of Quailburn Road Mr Brown noted that any buffer along that road (as recommended by Mr Glasson) would, in all likelihood, contradict the working nature of the existing environment that frames this road. Nevertheless, Mr Brown added that a pine shelterbelt next to the road would, if still required, fit in with the existing pattern of land uses in the road's immediate vicinity and serve to screen both the irrigation and proposed barn within a relatively short time frame. Mr Brown does not consider that such screening / filtering is either necessary or desirable for the margins of Lake Ohau Rd because of the much greater viewing distances involved and the flatter viewing perspective to both the proposed cubicle barn and pivot irrigation sites.
- 9.10 Noting the shelterbelts on and around neighbouring Ribbonwood Station and the past proliferation of wilding pines across the applicant's property, Mr Brown's view was that a pine shelterbelt would be more damaging in terms of the Waitaki's open, expansive, landscape character than the current proposals for the station according. Yet such effects, according to Mr Brown, both at present and in the future, have not been taken into account in Mr Glasson's assessment.

Cultural (Mr Mikaere)

- 9.11 Mr Mikaere stated that the purpose of his reply evidence was to respond to matters raised in the evidence of David Higgins, Di Robertson, Paul Horgan and Mandy Waka Home on behalf of Te Runanga O Ngai Tahu. In that response he set out at length a further review of the consultation process undertaken with Ngai Tahu. He was clear in his view a longer consultation would not have assisted in terms of identification of application specific issues, but may have been helpful in the formulation of appropriate mitigation, remedial and avoidance strategies. He was of the view that any issues around consultation had been remedied largely because of the content and nature of the FEMPs.

- 9.12 We note that that Mr Mikaere had acknowledged that the health and water quality of the Ahuriri Arm of Lake Benmore has been raised as specific issues in the CIA and by Ngai Tahu in their submission. We return to this issue later.

Aquatic ecosystems (Dr Greg Ryder)

- 9.13 In his right of reply Dr Ryder responded to several issues raised in the amended Section 42A reports and by a number of submitters, including MEL, DoC and Fish & Game.

Effects on Ohau C Canal

- 9.14 Dr Ryder noted that MEL remains concerned over the effects of increased nutrient inputs to the Ohau C Canal. He acknowledged that Ms Donna Sutherland (representing MEL) considered the individual applications by the applicant (and Five Rivers Limited) have not adequately assessed the implications of their land use intensification on the Wairepo Arm and associated Ohau B-C Canals.
- 9.15 Dr Ryder's view was that the canals are far from natural systems and to suggest they warrant nutrient management is overstating their ecological values. Dr Ryder also said that Ms Sutherland's report attached to the memo from MEL lawyers dated 5 March 2010 discussed the distribution of didymo in the canal and indicated that the Pukaki and Ohau canals were dewatered in late 2009 in order to undertake maintenance of the canal walls. Dr Ryder noted that such activities are hardly natural, but reflect the primary nature of the canal system – to efficiently convey water for hydro generation.
- 9.16 Regardless of the debate over the ecological values of these canals, Dr Ryder noted that it is his understanding that there will be relatively modest potential increases in the nutrient inputs to the Ohau C Canal (approximately 6-8% increase). Dr Ryder did not anticipate that such increases will result in a significant change to the plant and algae communities of the canal.

Monitoring

- 9.17 The approach adopted by these individual farms, and indeed MWRL, in relation to protecting the environment, is reliant on establishing a monitoring programme according to Dr Ryder. He noted that this program firstly establishes existing environmental conditions, secondly determines acceptable levels of environmental change, and thirdly tracks or monitors indicators through time and across the Basin to provide an information feedback loop to the consent holder and the regulatory authority.
- 9.18 Dr Ryder added that the consent holder (if granted) will be required to establish a sub-catchment monitoring plan that includes, among other matters, surface water nutrient and periphyton biomass monitoring at relevant node points. He added that pre-irrigation monitoring is intended to establish existing maximum annual periphyton biomass. He noted that the development of a baseline dataset for periphyton had already commenced through the monitoring of Dr Coffey and more recently Ludgate and Ryder (2010) which targeted the node sites throughout the Mackenzie Basin over the 2009/2010 summer.
- 9.19 Data generated from pre-irrigation monitoring is to be compared against post-irrigation monitoring data to assess, for example, whether the 25% increase threshold for peak periphyton biomass is being met. In Dr Ryder's view, this is a pragmatic and ecologically suitable approach to protecting key ecological values for streams and rivers of the Mackenzie Basin.
- 9.20 The FEMP also required monitoring of surface water quality, and for individual farms, according to Dr Ryder. Other proposed farm monitoring conditions relating to fencing of watercourses and monitoring of aquatic biota (fish, macroinvertebrates, macrophytes and periphyton), birds and mammalian predators are robust and in Dr Ryder's view will provide farmers, stakeholders and the regulatory authorities with robust information on the environmental effects of irrigation.
- 9.21 Having viewed further information produced since the commencement of the hearing, Dr Ryder concluded that he had no reason to change his ecological assessments and conclusions relating to these farms (including Glen Eyrie) as originally set out in his evidence in chief.

FEMPS (Dr Melissa Robson)

- 9.22 Dr Robson's right of reply provided comments on the Council's S42A Officer's Reports including (relevant to this application) Mr McNae, Ms Penman and Dr Freeman, the evidence of Ngai Tahu

expert Mr Paul Horgan, the submission of Dr Brookes (Waitaki First) and the evidence of Fish and Game expert Ms Christensen. Only those matters deemed relevant to the applicant's proposed activities have been included below.

Mr Darren McNae (S42A Officer for OVERSEER modelling)

- 9.23 In regards to the applicant's OVERSEER modelling Dr Robson addressed Mr McNae's concerns regarding the very low clover content. She noted that Mr McNae had acknowledged the applicant's reply to this concern and she agreed that the clover levels must be verified as a part of the OVERSEER audit.
- 9.24 Dr Robson also acknowledged that Mr McNae had raised issues with the effluent solids being removed from the system. She added that the removal of solids from the farm had been assumed in the modelling to ensure compliance with the NDA. Dr Robson noted that in Mr McNae addendum evidence he accepts this explanation, however he added that a concern remains as to the final destination of this organic nitrogen.
- 9.25 Dr Robson submitted that the fate of the removed nitrogen is beyond the remit of Mr McNae which was to focus on the reasonable use of inputs to the OVERSEER model. However, as the issue may be of interest to us, Dr Robson provided further details on the fate of the removed solids.
- 9.26 If the exported solids are used on another farm that is a part of these consent applications, regardless of where, Dr Robson explained that the import would be recorded in their nutrient budget and its compliance assessed. Alternatively, if the exported solids were used on a farm that was not a part of these hearings, as long as the inorganic fertiliser applications were scaled back to account for the nutrient applied with the solids, there should be no net change in losses according to Dr Robson. To put into context, Dr Robson explained that the amount of exported manure from the applicant's property, using a rate of 200 kg/ha, would only cover an area of 15 ha.

Evidence of Mr Paul Horgan

- 9.27 Dr Robson noted that Mr Horgan had quoted from the CIA that:

"Ngai Tahu ... is concerned at the possible conversion to dairy. Almost without exception, the conversion over recent years of dry land farms to dairying has brought with it a host of adverse environmental effects and has resulted in the significant degradation of our rivers, lakes, streams and wetlands."

- 9.28 Dr Robson added that in recognition of the potential deleterious impacts of some dairying systems, significant mitigation measures had been imposed to the dairy farming systems, including extended housing. Dr Robson stated that while Mr Horgan is making well-versed criticism of conventional dairying, he did not seem to have considered that the applicant is proposing extensive and expensive mitigation measures. She added that these measures aim to prevent or minimise the types of damage that have come to be associated with dairy farming, in terms of degraded waterways, degraded stream banks, effluent pollution, soil compaction and erosion with associated P loss, and winter losses of nitrate associated with urine patches.

Evidence of Ms Devon Christensen

- 9.29 Dr Robson noted that Ms Christensen expressed doubt as to whether the housing of stock and reduction of N fertiliser offered a sufficient suite of mitigation tools. According to Dr Robson the removal of stock and the reduction of N fertiliser are the two most effective mitigation measures for reducing N loss for a pastoral system.
- 9.30 Ms Christensen suggested that because changes can be made to the FEMPs, nothing in the FEMP ties the farmer into a serious commitment. Ms Christensen has misunderstood the nature of the changes permissible in the FEMPs according to Dr Robson. She added that it is essential that the FEMPs may be able to be updated and farm systems change as site specific risks arise or become obsolete. She added however to suggest that this flexibility means that they do not bind the farmer to a commitment, is incorrect.
- 9.31 Dr Robson added that the FEMPs, through their mitigation measures, monitoring and auditing plans that include triggers, contingency plans if triggers are exceeded and actions in case of non

compliance with audit measures, are not 'take it or leave it' recommendations, but form an auditable part of the resource consent that is tailored to the specific farm and farming system.

- 9.32 Again Dr Robson noted that Ms Christensen suggested that some wording in the FEMPs does not show a commitment to addressing risks by the use of the word "should" and that it should be replaced with the word "shall". Ms Robson stated that these FEMPs and FERAs are not written as a series of resource consent conditions but rather are aimed for use on farm by farmers.

Evidence of Dr Helen Brookes

- 9.33 In response to Dr Brookes' comments that pivots delivering effluent that also cross streams must also apply effluent to those streams, Dr Robson said that although she had previously stated that to avoid effluent application to streams, solenoid valves were originally proposed, this had recently been superseded. Now none of the centre-pivot irrigators used to irrigate the effluent would cross streams. She added that any liquid effluent will be applied by tanker in those paddocks that have streams running through the pivot circles.
- 9.34 Dr Robson responded to Dr Brookes description of using the same management provisions for prevention of effluent entering a watercourse for two virtually identical effluent irrigation systems as 'sloppy' by stating that if the management provisions for two similar systems, to prevent the same outcome on neighbouring farms with comparable streams had been very different, this would have been more likely to raise a question of confidence.

Conclusion

- 9.35 Dr Robson concluded that she believed that these FEMPs go much further than a step in the right direction and that they outstrip what has yet been seen in New Zealand in terms of combating both diffuse and point source pollution from farms. None of the evidence she has heard at this hearing had caused Dr Robson to deviate from her viewpoint. She added that the consent conditions presented by Mr Kyle that tie these FEMPs in allowing them to be enforced are a key step to their success.

Proposed Activity and lock-step approach for groundwater monitoring (Ian McIndoe)

- 9.36 Mr McIndoe's right of reply evidence responded to evidence given by Council Officers in their S42A Reports.

Effluent application

- 9.37 Mr McIndoe noted that the S42A Officer questioned how irrigation over water bodies would work in combination with effluent applications. He stated that the effluent will not be applied to land where the pivot crosses water ways and the worst that could happen is that water would be applied to water bodies where the pivots pass over. In his view, irrigating the riparian margins would be beneficial, especially during the plant establishment phase.
- 9.38 According to Mr McIndoe the technology for controlling individual sprinklers on pivots has been established in New Zealand over the last year and is currently being fitted to pivots at several locations. Consequently, he added that if situations arise where sprinklers need to be turned off, that can be easily arranged.

Irricalc – reasonable use

- 9.39 In her S42A Addendum Ms Penman suggested that a favourable comparison of the Irricalc input parameters against field measurements is undertaken prior to granting of consent, to be satisfied that the proposed volume is reasonable for the property (refer Section xx).
- 9.40 Mr McIndoe noted that Irricalc is a soil water balance model that has been calibrated against field measurements on the Canterbury Plains. The method is well-recognised for determining irrigation demand. He added that neither Irricalc nor the WQN9 method had been specifically calibrated against soil moisture measurements from the Mackenzie Basin, because such data does not yet exist. In Mr McIndoe's view it is unrealistic to compare Irricalc parameters against field measurements for specific farms before they are irrigated as the pasture would need to be irrigated in order to undertake the measurements.
- 9.41 When the consents are exercised, Mr McIndoe noted that water use and soil moisture measurement would occur, and checks for reasonable and efficient use could be made. Mr

McIndoe added that conditions have been proposed to ensure good irrigation practices and efficient application of water is achieved.

Lock-step approach for groundwater monitoring

- 9.42 Mr McIndoe noted that Dr Bright's evidence in reply (for MWRL) described the proposed lock-step approach for the groundwater sub-catchments in the upper Waitaki Basin. He added that this evidence was largely generic and described the approach in more detail, using the applicant's property as an example.
- 9.43 We have studied Mr McIndoe's evidence on this matter and refer to it again in our Section 104 evaluation.

Terrestrial ecosystems (Dr Ruth Bartlett)

- 9.44 In her right of reply evidence Dr Bartlett discussed matters raised in the evidence of Mr Mark Webb on behalf of Fish and Game, Ms Sue Maturin and Ms Anna Cameron on behalf of the Royal Forest and Bird Protection Society and Dr Susan Walker on behalf of Mackenzie Guardians. Dr Bartlett also responded to comments and recommendations from the relevant Section 42A Reports.
- 9.45 Dr Bartlett undertook additional surveys of Glen Eyrie Downs and collected further information from the property owners / managers about the land use practices and cultivation activities on the applicant's property. Dr Bartlett categorised the current land use into four categories being: 'natural', 'over sown', 'direct drilled' and 'fully cultivated'. Dr Bartlett overlaid these four classifications onto topographical maps and added the proposed irrigation layout to show the existing land use on the areas that would be subject to irrigation. From this information Dr Bartlett made the following observations:
- 9.46 Almost all of the land at Glen Eyrie has been fully cultivated, having been ripped and disced after the removal of wilding pines. Much of the area is now being cropped for biodiesel production.
- 9.47 These farm practices have resulted in a very limited indigenous species presence and most native species are now restricted to riparian areas and those which were not cultivated, or a small area in the northern corner, north of Six Mile Creek.
- 9.48 Dr Bartlett noted that stream channels and riparian vegetation in this heavily modified landscape can be considered to be of high ecological value since they preserve elements of indigenous species and processes that are now of limited distribution in the Ecological District. She added that the riparian areas are proposed to be retired from grazing, fenced to exclude livestock and planted with appropriate species to assist in nutrient removal and improving habitat connectivity.

Consent conditions (Mr Kyle)

- 9.49 In his right of reply Mr Kyle provided a set of proposed consent conditions for the applicant's consent. He also included a flow chart that explained how the approach to conditions in terms of response to the proposed OVERSEER modelling and water quality monitoring would be achieved.

10 STATUTORY CONTEXT

- 10.1 As already noted, the proposed activity is a **non-complying** activity under Rule 18 of the WCWARP. The relevant statutory context for non-complying activities is set out in detail in our Part A decision. In accordance with those requirements, we have structured this evaluation section of our report as follows:
- (a) Evaluation of effects
 - (b) Evaluation of relevant planning instruments
 - (c) Evaluation of other relevant s104 matters
 - (d) Section 104D jurisdictional hurdles
 - (e) Part 2 RMA

- (f) Overall evaluation

11 EVALUATION OF EFFECTS

- 11.1 Drawing on our review of the application documents, the submissions, the Officers' Reports, the evidence presented at the hearing and our site inspection, we have concluded that the effects we should have regard to are:
- (a) Effects on other users
 - (b) Visual and Amenity and Landscape
 - (c) Terrestrial Ecology
 - (d) Groundwater
 - (e) Water Quality and aquatic ecology
 - (f) Cultural
 - (g) Positive effects

Effects on other users

- 11.2 Mr McIndoe provided evidence that MEL had provided its derogation approval, which he contended confirmed MEL did not have issues in respect of the allocation limit for Lake Ohau being exceeded. He told us the level of exceedance was 0.408Mm³/yr. He further noted that Lake Ohau will continue to operate within its normal water range, thus the only effect of the take is an effect on MEL in terms of power generation. He contended that the potential effects on other recreational users would be minor. He said there would be no effect on various community abstractions and individual abstractions for domestic and stockwater purposes.
- 11.3 We accepted his views on this point and note that we did not receive any contrary views. We also note in her addendum report Ms Penman accepted the views of Mr McIndoe, particularly in respect of MEL being the primary affected party, had been adequately dealt with. We therefore accept that effects on lake levels and other users will be acceptable if the proposal is granted.

Visual and Amenity and Landscape Effects

- 11.4 In our Part A decision we summarised the evidence of a number of landscape experts who expressed differing views about the effects that irrigation would have on visual effects. We reached some general conclusions on the issue and set out our general approach for assessing landscape effects for each individual proposal. We now move on to apply this assessment approach to the current proposal.

Existing landscape

- 11.5 Mr Glasson identified the subject area as being within Landscape Unit – Quailburn. We do accept his description and assessment of this Landscape Unit. In summary form, we accept his view that the highly legible geomorphic processes that shaped this landscape remain to be seen. Secondly, because of the low vegetation cover over this landscape, those natural landform patterns of moraines, depressions and outwash gravels are clearly visible.
- 11.6 We do accept what he says (and for that matter, supported by other landscape experts) that of significance this landscape provides panoramic views of the Newman and Ben Ohau Ranges. We also accept that many tourists and recreationists pass on route to the Rua Taniwha Conservation Area, the Ohau ski-field, and Central Otago.
- 11.7 We agreed with Mr Glasson and Mr Brown that there are modifications to this Unit, principally brought about by farming operations. We also accept Mr Glasson's view that State Highway 8, being the main conduit through this Unit is the viewing point of concern although there is moderate visibility from Quailburn and Lake Ohau Roads as well.

Effects on landscape

- 11.8 It was generally agreed between the different experts that granting consent to the proposal would bring about the following changes to the landscape:
- (a) Visibility of irrigation infrastructure in particular the 26 pivot irrigators;
 - (b) The presence of six milking and wintering sheds sites; and
 - (c) The 'greening' effect of the irrigation area.
- 11.9 We move on to assess the significance of these changes, taking into account the evidence received from the various experts.

Significance of effects

- 11.10 A useful reference point when considering the significance of the change is how the landscape is treated in the relevant district plan. In this case the Waitaki District Plan provides the subject site is zoned as a rural scenic zone. The plan provides that the rural scenic zone has particular visual amenity that is associated with the dominance of open-spaced vistas and landforms, lack of intense subdivision and land use, and the overall absence of buildings and structures. However farming and irrigation are permitted activities within the zone. The site does have placed in a central position an Outstanding Landscaped Area (OLA) recognised in the Waitaki District Plan and known as the DoC Reserve.
- 11.11 All of the experts agreed that some form of mitigation in terms of buffering was required. However there was a difference of opinion as to the extent of mitigation that was necessary. In general, Mr Glasson and Ms Lucas supported more extensive mitigation measures than Mr Brown, including larger buffering setbacks.
- 11.12 Overall, we prefer the mitigation measures proposed by Mr Glasson (particularly buffering along Quailburn Road, Serpentine Creek, Wairepo Creek and the DoC Reserve, accompanied with the removal of the south-western pivots and removal of the sheds along Quailburn Road) and come to the conclusion that without those measures we could not support the grant of consent in landscape and amenity terms. We say this because the mitigation measures are required to protect the outstanding natural feature, namely the DoC Reserve (Wairepo Kettleholes Conservation Area). Also, we consider the setback and buffering of streams on this site is important because of the contribution to the naturalness of the site that the named streams provide. The balance buffering is required, we think, to provide mitigation of views along Quailburn Road and other viewing points as earlier described.
- 11.13 If these mitigation measures are included we consider the proposal could proceed without compromising the landscape and amenity values. However this conclusion must be considered in combination with our findings upon other issues particularly water quality to inform our overall decision as to whether consent should be granted.
- 11.14 We are also mindful of Mr Glasson's other point that the Quailburn Landscape Unit has proposed large scale irrigation developments. There is significant coverage by irrigation within this landscape unit. Mr Glasson was cautious in his view that even with mitigation measures that he proposed being adopted there would still remain to be moderate to adverse cumulative landscape effects.

Terrestrial Ecological Effects

- 11.15 The principal effect of the irrigation on terrestrial ecological values will be the complete displacement of any native vegetation within the irrigation command area (except those areas protected by buffers). This is undisputed and was acknowledged to be so by Dr Bartlett.
- 11.16 There appears to be little dispute as to the low ecological value of the residual native vegetation after the major land disturbance due to the removal of wilding pines and subsequent sowing of crops.
- 11.17 The property has been subject to tenure review and as noted by Dr Bartlett there are some areas of overlap with RAPs (Recommended Areas of Protection - A place identified as a priority for protection because it contains the best example(s) of its type or class of natural ecosystem

and/or landscape in an ecological district) around Serpentine Creek and in a drainage channel adjacent to Wairepo Creek. We note Dr Walker states there are no areas of overlap with RAPs.

- 11.18 While Dr Bartlett has proposed mitigation in the form of 5 m buffers around these RAPs, and states that the vegetation within them will be enhanced, and is in any case well represented within the DoC reserve, we do have concerns about the long-term sustainability of these areas.
- 11.19 Similarly, we note the Wairepo kettleholes (DoC reserve) will be all but encircled with irrigators. We do have concerns (although it has not been argued as such by submitters) that irrigation drainage will affect vegetation within this reserve over the long term.
- 11.20 We do, however, note and agree with Dr Bartlett's evidence that the establishment of pasture will arrest soil erosion and the riparian enhancement around stream channels can be expected to have a positive effect on aquatic habitat.

Groundwater

- 11.21 As all drainage from rainfall on the applicant's property is understood to go to groundwater (undisputed evidence of Dr Bright on behalf of the applicant) the flow direction of that groundwater, its speed of travel, and its interactions with surface waters are of critical importance. Dr Bright was confident in the predictions made from the WQS. However Mr Callander (on behalf of MEL) was of the view that there is a large degree of uncertainty associated with how that partitioning of water into each sub-catchment has been carried out. The Section 42A Officer did not offer advice on this issue that could influence our decision.
- 11.22 As discussed in Part A, we agree with Mr Callander, that the groundwater modelling carried out by MWRL provides a useful conceptual understanding of the overall geohydrology of the Upper Waitaki Catchment. However we consider that it lacks the data, precision and clearly defined error limits on predictions to enable reliable verification of flow paths, travel times and nutrient concentrations that we believe are necessary to assess the cumulative effects of the total MWRL proposition that all the applications before us at this hearing can be granted without causing more than minor water quality effects. We agree with Mr Callander that the paucity of data to support validation of groundwater modelling (in the case of Wairepo and Quailburn catchment there is no data) is the primary reason for the large degree of uncertainty associated with the partitioning of groundwater flows.
- 11.23 Dr Bright argues that there is an approximately 60:40 split in terms of flow direction to the Wairepo Arm of Lake Ruataniwha or Ahuriri Arm of Lake Benmore, respectively. In the context of this application we must consider whether the large uncertainty in this partitioning is critical in terms of the actual and potential effects arising from the proposal.
- 11.24 Our view is that the partitioning will only be critical if there is a marked difference in the acceptable assimilative capacity between the two catchments. In other words, if the Wairepo sub-catchment could assimilate an additional quantum of nitrogen and phosphorus from the proposed irrigation without causing an unacceptable change in the trophic status of the Wairepo Arm of Lake Ruataniwha, whereas this same quantum discharged into the Ahuriri sub-catchment could not then it would be critical to know the "catchment divide" with a reasonable degree of certainty. Similarly there was a known assimilative capacity in one or both sub-catchments that could be utilised without causing unacceptable changes in trophic status then it would be important to have accurate partitioning in order to predict the whether the acceptable load would be breached in one or both catchments. If on the other hand, a high proportion of the proposed nutrient load could be safely assimilated by both sub-catchments, then the accuracy of the partitioning becomes less important. If neither sub-catchment can assimilate a significant quantum of nutrient without causing an unacceptable change in trophic state then the partitioning of load is not an issue.
- 11.25 We discuss the effects of the nutrient load on the two receiving water bodies in the following sections but we do not believe it is necessary to obtain more information on the partitioning of groundwater flow between the Wairepo and Quailburn catchments in order to arrive at our decision.
- 11.26 We note from the FEMP that the applicant proposes a 'trigger for action' of > 2mg/L NO₃-N from the current modelled baseline conditions. We discuss the appropriateness of this trigger in terms of the WCWARP below, but we record here that in terms of actual effects, our principal concern is with respect to surface waters, which we address in the next section.

Water Quality and aquatic ecology

- 11.27 In Part A of this decision we rejected the MWRL proposition that all consents sought in this hearing could be granted (with conditions) and without causing cumulative water quality effects. It is incumbent upon us, therefore, to consider (as far as is possible) whether granting this application, in combination with other water permits we grant, will lead to unacceptable water quality effects. In this case it means considering the potential effects of granting this application (in combination with others we grant) on:
- (a) The trophic state of the Wairepo Arm of Lake Ruataniwha;
 - (b) The trophic state of the Haldon Arm of Lake Benmore (through nutrient additions to the Ohau C canal);
 - (c) the trophic state of the Ahuriri Arm of Lake Benmore (through the Quail Burn);
 - (d) Groundwater chemistry and in particular the proposed threshold of 2 mg/L nitrate-nitrogen; and
 - (e) Periphyton growths and other ecological effects in Six-mile, Serpentine and Wairepo Creeks, the Quail Burn and Ahuriri Rivers.
- 11.28 The applicant has proposed significant mitigation measures to lessen the risk of their activities contributing to cumulative water quality effects. We need to consider whether the proposed mitigations, are, in our view sufficient to avoid significant water quality effects occurring, and/or whether refinements to the measures proposed are required.
- 11.29 A starting point for the consideration of effects on points (a)-(e) above is the FEMP. Evidence on the FEMP was given by Dr Robson, but for consistency with other decisions we have independently audited the FEMP. Key points arising from our audit and additional to Dr Robson's evidence are summarised below.
- 11.30 The main soil series on Glen Eyrie is Ohau (> 80 %), although there are small incursions of Fork and Cass/Craigieburn/Cox soils in the north of the property, Pukaki/ Holbrook soils in the east, Bendhu and Glen Eyrie soil in the south and Buscot/Sawdon/ Dobson soils running through the property along the course of the Wairepo Creek.
- 11.31 Two soil profiles transects at the north of the property perpendicular to six-mile creek, and at the south parallel with Serpentine Creek showed much shallower soils (depth to C horizon) in the north (median ~35cm) than the south (median ~75 cm). As noted in Part A there are good reasons to expect that OVERSEER will underestimate nutrient load from shallow soils (as evident in the northern transect), which is why Dr Snow (on behalf of MWRL) recommended that the highly developed setting (which ignores nitrogen immobilisation) be used as a pragmatic conservative measure. There is insufficient information in the FEMP to gauge the extent of shallow soils and therefore whether the highly developed setting would provide a more conservative basis for estimating nitrogen losses. We acknowledge that there is a divergence of opinion (see Part A) on the scientific basis for using the highly developed setting.
- 11.32 For Glen Eyrie Downs, the WQS identified groundwater as requiring the most nitrogen mitigation and the Ahuriri Arm the most phosphorus P mitigation. The resulting NDA calculated for Glen Eyrie was 38,139 kg nitrogen and 1,621 kg phosphorus per annum, respectively.
- 11.33 The 5 farm systems modelled were all within this cap, even using the highly developed setting. We note that the calculated nutrient exports approximately equal the NDA for all systems except for cut and carry, which has a predicted nitrogen export ~10000 kg per year less than the other systems (phosphorus ~200-300 kg/y less).
- 11.34 In addition to the cubicle barn dairy system, the revised FEMP tables a conventional dairy system with all effluent removed from the catchment.
- 11.35 The maximum modelled contribution from Glen Eyrie Downs to groundwater nitrate concentrations after 5, 20 and 30 years, is 0.3, 0.25 and 0.25 mg/l nitrate-N respectively.
- 11.36 The cubicle barns and effluent management options are factored into OVERSEER. We accept the evidence of Dr Robson for MWRL and Dr Ryan (#10.98) for Meridian (see Part A) that the housing of cows over winter the farms should result in a significantly reduced leaching load

compared to a typical New Zealand dairy farm system and that nitrogen loads of the order of 16 –21 kg N/ha/y are achievable.

- 11.37 The exclusion of stock from watercourses and by planting and fencing dual function riparian margins is not factored into OVERSEER. We consider this a worthwhile mitigation but note that its primary function will be to improve aquatic habitat, rather than nutrient stripping, even though the design of the dual function riparian margins seems well thought out and should be effective.
- 11.38 None of the other mitigation measures proposed in the FEMP are likely to result in significant nutrient reductions above that predicted in OVERSEER and/or could be expected using good agricultural practice.
- 11.39 Therefore the critical issues are:
- (a) Is the predicted nutrient load from the five farming systems realistic?
 - (b) What effect will the predicted nutrient load (alone and in combination with other applications we grant) have on the relevant surface water bodies making reasonable assumptions about flow paths?
 - (c) Can the effects be avoided, remedied or mitigated?

Predicted load realistic

- 11.40 The inputs to OVERSEER were audited by Mr McNae who reported a number of issues with the inputs, viz, very low clover content of pasture, high reliance of cubicle barns and feed pads to meet NDA (dairy option) and use of only the developed setting. Dr Robson partially addressed these issues in her right of reply agreeing that the clover content would need to be part of the annual OVERSEER audit. We note the latest revision of the FEMP did include the highly developed option but that in comparison to other properties appeared to make a relatively small difference to predicted nitrogen losses. As pointed out in # 12.27 a conventional dairy farm with effluent removed from the property was introduced in the final version of the FEMP. However there was no discussion as to how this would be achieved and whether the effluent would be removed out of the catchment and if not whether the effluent was accounted for in the FEMP of the property to which it was exported.
- 11.41 Overall we are of the view that the OVERSEER modelling may have underestimated nitrogen losses in particular from Glen Eyrie Downs. This is because of the lack of information on the extent of shallow soils, but also because of the caution voiced by Mr McNae. The farm systems modelled appear to be finely optimised to predict nutrient loading closely matching the NDA, which does not in our view give any margin for error. All farm systems with the exception of cut and carry appear to predict very similar nutrient losses, which is understandable in terms of the applicants wish to maximise return on investment within the environmental parameters they perceive to be working within. However the stochastic nature of the modelling, together with the lack of sensitivity analysis of particular parameter do not give us much confidence that the NDA would be met, or that if it was not, the farm system could easily be changed to bring it into compliance within short order.

Effects on waterbodies

Wairepo Arm

- 11.42 In Part A MWRL witnesses (Bright and Robson) stated that to maintain the Wairepo Arm in its current mesotrophic state, nutrient losses from the proposed irrigated area will have to be 16.4 kg N/ha and 0.7 kg P/ha less than is estimated to occur under good agricultural practice. This was based on the trophic level index (TLI) in the Wairepo Arm being 3.18.
- 11.43 However Ms Sutherland (on behalf of MEL) submitted that the median summer TLI (from 3 years of data prior to her writing the report) was 3.7, which is towards the eutrophic end of the scale, and, if assessed on total phosphorus the TLI was 3.95 (almost at the eutrophic boundary). She argued that water quality in the Wairepo Arm appears to be degrading under the existing land-use intensification, and that by inference, further nutrient additions will push this water body into the eutrophic zone. In her addendum evidence she showed satellite photos (Figure 4) which demonstrated a dramatic increase in pivot irrigation in the Wairepo sub-catchment between 2005 and 2009, which supported her premise that water quality was degrading.

- 11.44 We have not received guidance from the s42A officers on how much additional nutrient load the Wairepo Arm could absorb without becoming eutrophic, which all experts agree would be an undesirable consequence. However there are 4 applicants for new irrigation before this hearing that propose significant irrigation within the Wairepo catchment: Five Rivers, Glen Eyrie (47% in catchment), Birchwood Run, and Marie Horo.
- 11.45 It is difficult to compare the likely nutrient loads emanating from these properties, however based simply on area proposed to be irrigated Glen Eyrie could potential contribute 27% if using the groundwater subcatchment areas given by Dr Bright (972 ha - 27279 kg, Ohau 2000 ha 55423 kg, Birchwood 56 ha,6988 kg, Horo 150 ha, 12457 kg) of an increased load above that occurring currently.
- 11.46 We agree with Ms Sutherland that there is a significant risk that the Wairepo Arm may turn eutrophic with any significant increase in nutrient load, and that indeed based on travel time considerations and the trends she observed, it may still turn eutrophic from recent (2004-2009) irrigation developments which may not yet be exerting its full effect due to travel time considerations. Therefore we need to be conservative in our assessment. In our view, the more than 25% increase in load represents an unacceptable risk of to increasing the trophic state of Wairepo Arm into the eutrophic band. The uncertainties with respect to the proportion of Glen Eyrie within the Wairepo groundwater catchment increase our disquiet still further, as does the possibility that Wairepo Arm may be more sensitive to phosphorus additions (in terms of TLI) than nitrogen.

Haldon Arm of Lake Benmore

- 11.47 In Part A we determined that the Haldon Arm of Lake Benmore can assimilate an increased nutrient load from the granting of consents (with mitigation) and remain within an oligotrophic state. While we did not accept the MWRL proposition as a whole (that all consents could be granted) we did accept that the increased nutrient load from irrigation would not cause a more than minor effect to the Haldon Arm of Lake Benmore; mainly because of the high inflows from the Ohau B/C canal and the concomitant relatively short residence time.
- 11.48 Our view is that there is insufficient information from which to assess whether Meridian's operation of Ohau B canal will be impacted by the applicant's proposal. However our opinion is that nutrient-related operational issues in Ohau B/C canal are only likely to arise through didymo proliferation, and that this is not a major issue for our consideration. We agree with Dr Ryder (for MWRL, Part A) that Meridian is in the best position to manage didymo biomass by manipulating water levels and flows.

Ahuriri Arm of Lake Benmore (from the Quailburn catchment)

- 11.49 In part A we determined that the Ahuriri Arm of Lake Benmore was already close to the oligotrophic-mesotrophic boundary. MWRL agreed with this assessment, but submitted that through improvements to replacement consents and significant nutrient mitigation of new consents, all consents could be granted without causing the oligotrophic-mesotrophic boundary to be breached. We disagreed with the MWRL submission for the reasons given in Part A. Therefore we need to assess each application on its own merits, but taking into account any other applications we grant.
- 11.50 In Dr Freeman's addendum (on behalf of the Regional Council) he gave a useful summary of estimated total property nitrogen loads to the Ahuriri Arm associated with irrigation development proposals, together with their priority as determined by Professor Skelton on the basis of the date the application was deemed to be notifiable. Glen Eyrie Downs was at the top of Dr Freeman's list (Table 5, Freeman addendum) in terms of the potential risk to Ahuriri Arm should the consents be granted. We agree with Dr Freeman's assessment and note that Glen Eyrie Downs would contribute ~19% of the nitrogen load entering the Ahuriri catchment from new applications before us (using the groundwater partitioning submitted by the applicant).
- 11.51 Even without considering cumulative effects that could be caused by the granting of the other applications before us, we consider that the load contributed by Glen Eyrie Downs alone may be sufficient to cause the Ahuriri Arm to become mesotrophic.

Groundwater

- 11.52 We agree with Dr Bright that effects on groundwater in this case are manifest by interaction with surface waters and that groundwater is largely a matter for policy considerations.

Periphyton growths in 6-mile, Serpentine and Wairepo Creeks

- 11.53 Dr Coffey's evidence (MWRL, Part A) included information on periphyton surveys in Wairepo Creek. He reported an increase in average periphyton cover and biomass between sampling sites Wairepo Upper and Wairepo Lower, but both cover and biomass were relatively low. He also noted there was no existing irrigation upstream of hard-bottomed sampling site Wairepo Upper or Wairepo Lower. However, there was extensive existing irrigation between Sampling Sites Wairepo Lower and the soft-bottomed Wairepo Node. We note from Dr Ryder's evidence that the bed substrate in creeks within Glen Eyrie Downs are generally dominated by gravels and small cobbles, with areas of fine sediments. Thus we conclude, that at least a proportion of stream beds would be susceptible to nuisance periphyton growths should nitrogen and or phosphorus concentrations in the creek water be above that limiting periphyton growth (under stable flow conditions).
- 11.54 Whilst we accept the applicants experts' (Drs Bright, Bartlett, Ryder, and Robson) views that the combination of dual purpose riparian zone proposed, the relatively small length of the creek within the boundary, and the dominant direction of groundwater flow mean that it is unlikely that Wairepo Creek within the Glen Eyrie property will gain nutrient-rich groundwater and therefore accumulate nuisance growths of periphyton, we agree with Dr Freeman that there is insufficient evidence to support the theory that drainage water largely bypasses the Wairepo Creek downstream of the property.
- 11.55 Six-mile creek only crosses the property boundary in the northern corner and predominant groundwater flow together with the proposed mitigation mean that there are unlikely to be problems with periphyton. However we are much less certain that Serpentine Creek in the southern part of the property will be unaffected. The creek and tributaries occupy a significant proportion of the farm south and east of the Department of Conservation reserve, and we are of the view that even with good riparian protection and the setback of irrigation, the creek is likely to experience nuisance periphyton growths.
- 11.56 In Part A we rejected the MWRL proposal that the threshold for periphyton growth should be a 25% increase in maximum annual biomass calculated from modelled 'current' nutrient concentrations. We found instead, that MfE periphyton guidelines are applicable and should be used to protect streams from nuisance periphyton growths. We are of the view, that if MWRL were to calculate NDA's based on the MfE guidelines, then a much lower threshold would have been calculated and periphyton growth in Serpentine and Wairepo Creeks may well have presented the most restrictive limits for nitrogen (rather than groundwater).
- 11.57 There is insufficient information as to whether the Quail Burn and Ahuriri Rivers could be impacted by periphyton should the consent be granted, however we note:
- (a) Dr Coffey identified nuisance growths of periphyton in the lower Quailburn even though there was no irrigation evident upstream. No description of physical stream habitat was given;
 - (b) Mr Callander cautioned that achieving thresholds at the Quail Burn node was predicated on there being significant riparian denitrification in the catchment, even though no measurements to that effect have been made;
 - (c) While Dr Coffey found no nuisance levels of periphyton in the Ahuriri River (other than didymo) , he did report deterioration in habitat quality from the upper to lower reaches.
- 11.58 We conclude that while leachate from Glen Eyrie Downs alone is unlikely to cause nuisance periphyton growths in the Ahuriri River (because of dilution effects in this unregulated river), it may well do so in combination with other consent applications before this committee should they be granted.

Avoided, remedied or mitigated

- 11.59 We acknowledge the considerable efforts the applicant has proposed to mitigate the effects of their activities. We agree that the cubicle barns (dairy option) and the dual function riparian margins are amongst the most effective measures they could take to reduce nutrient export to surface and groundwater from their property. However, we are still not convinced that even these significant mitigation measures will be sufficient to avoid adverse environmental effects as outlined above.

- 11.60 The applicant has proposed a lock-step approach as a measure to ensure that any remaining 'unknowns' are addressed before their activities are fully developed. This is an advancement of the applicant's thinking on adaptive management about which we gave our views in Part A.
- 11.61 The lock-step approach in essence, includes the design and implementation of a pre-irrigation monitoring programme. Simply put, if the baseline assumptions are not confirmed through this monitoring, then irrigation cannot commence.
- 11.62 While attractive at first blush it raised for us the question: Why should consent be granted in the circumstance where what we considered to be fundamental pre-consent research was either not completed or not completed adequately?
- 11.63 Our concern with this approach is that while we see the sense in the circumstances of this case of pre-irrigation monitoring, we note that, firstly, it is more than pre-irrigation monitoring; indeed, it is the design and implementation of a pre-irrigation monitoring programme.
- 11.64 Next, if we are to grant consent on this basis, then our view of the evidence produced there is a very real risk the applicant group would not be able to proceed beyond the pre-irrigation monitoring programme. Rather than grant a consent that could not be given effect to and which might create difficulties for both the applicant group and the consent authority, we considered it more appropriate that we recognise, through declining consent, that the applicant bears the primary responsibility of coming to a hearing with adequate information.
- 11.65 In addition, to the lock-step approach, the applicants have (in Mr Whata's closing arguments) proposed staging (capping nutrient discharge at 80% of the provisional NDA in the first full five years of irrigation) and ratcheting (a mechanism that provides for reducing nutrient discharge in the event that the monitoring reveals that loadings are approaching 90% of the Ahuriri TLI threshold).
- 11.66 The difficulty we have with both of these suggestions is that we are of the view that the Ahuriri Arm is already close to the oligotrophic-mesotrophic boundary and even 80% of the proposed NDA would be sufficient to effect that change in state. Similarly, after 5 years of nutrient discharge (excluding allowances for travel time) we would be reasonably certain that the Ahuriri Arm would have crossed the mesotrophic boundary. In our view, to be irresponsible to grant a consent on the basis that once the Ahuriri Arm reached that undesirable state, the applicants would then have to ratchet back their nutrient discharge.
- 11.67 In summary we are of the view that the lock-step approach should not be a substitute for a robust AEE and/or supporting evidence in which the state of the existing environment is adequately described and reasonable efforts are made to address reasonably foreseeable environmental effects. As discussed in Part A we are of the view that the MWRL WQS falls short of the standard expected for a proposal (the total consents for irrigation before us) of this magnitude.

Cultural

- 11.68 Ngai Tahu formally opposed the granting of all consents for irrigation at this hearing. However during the course of the hearing Mr Horgan reiterated the position stated in the CIA which was that Ngai Tahu supports water being made available to provide security of supply for landowners but is concerned at the possible conversion to dairying. Mr Horgan summarised Ngai Tahu's position as being:

"The Ngāi Tahu experience with large scale land use intensification has, almost without exception, been negative. From our perspective, there is an unequivocal link between irrigation related activities and waterway degradation, and in turn, further loss of access to mahinga kai resources. In this context, it is our view that these consents should only be granted if you are satisfied that there is a high level of certainty that the package of mitigation measures proposed by the applicants (in particular the Farm Environmental Management Plans) will ensure that sustainable water quality outcomes are achieved. In the absence of such certainty, then we submit that you must adopt a precautionary approach and decline the consents."

- 11.69 While we acknowledge that the mitigation measures proposed by the applicant go further than many other large scale dairy conversions that have gone before it, we do not have the high degree of certainty Ngai Tahu are seeking, that sustainable water quality outcomes will be achieved.

- 11.70 In addition approximately half the leachate from Glen Eyrie Down will drain to the Ahuriri River which enters Lake Benmore via the Ahuriri delta. The Ahuriri delta is of particular cultural significance of the delta to Ngāi Tahu as a source of mahinga kai and is a focus of their restoration efforts (see Part A).

Positive effects

- 11.71 The granting and exercising of these consents will have positive economic effects, both for the applicant, the district, and indeed the country. There will also, in our view be significant positive benefits in terms of reducing or halting wind-borne soil erosion over a large tract of land and providing a means of controlling invasive species such as wilding pines and hieracium. The dual function riparian margins along 6-mile Creek, Serpentine Creek, and Wairepo Creek will also have significant positive effects with respect to improving aquatic habitat within the applicant's property.

Permitted baseline

- 11.72 In accordance with s104(2), we have the discretion to disregard an adverse effect on the environment where the relevant plan permits an activity with that effect. The issue of the permitted baseline was raised on several occasions by the applicant in relation to the effects of permitted activities (including minor water takes and dryland farming) on landscape and nutrient loads.
- 11.73 Indeed Mr Whata's closing legal submission argued that nitrogen losses arising from a permitted baseline scenario at Glen Eyrie would be nearly 10 kg/ha/y higher than the proposed cubicle barn scenario. Given that there was no opportunity for this proposition to be rebutted by submitters or commented upon by s42A experts, we have had to evaluate the merit of Mr Whata's arguments. While the proposed permitted baseline of 1.5 cattle/ha and lucerne on better soils may be possible agronomically (described as 'non-fanciful' by Mr Whata) we do not consider that it would be sustainable economically. If it were, we would expect such farm management to have been adopted by the current owner, since it requires little capital investment.
- 11.74 Additionally, while we have not seen the modelling for this scenario, we find it difficult to believe that such a permitted baseline would result in nearly 24 kg nitrogen/ha/year losses in such an arid region without irrigation. Similarly the proposed losses under cubicle dairying have been modelled using the developed setting of OVERSEER, which given the reservations about underestimates of leaching losses discussed in Part A, appears to be the lower end of the range in likely losses.
- 11.75 In conclusion, we have considered Mr Whata arguments about likely nutrient losses under a permitted baseline scenario versus the losses likely to arise from an irrigated pasture scenario in coming to our decision. However we consider such a scenario to be unrealistic and inappropriate for the purpose of comparison.

Key conclusions on effects

- 11.76 In relation to the actual and potential effects of the proposal, our key conclusions are as follows:
- 11.77 On balance, overall we prefer the views expressed by Mr Glasson that buffering as earlier described in his evidence is necessary to ensure that landscape and amenity effects will be minor.
- 11.78 The existing terrestrial vegetation on Glen Eyrie Downs is of low ecological value due to the extensive recent land clearing operations. Irrigation will irreversibly eliminate any residual native vegetation, but there are representative reserves within the applicant's property, which should will be unaffected by the applicant's activities. There are areas of overlap between proposed irrigation and RAPs however the actual ecological values of these areas are low due to land clearance, and the applicant proposes buffer zones around creeks that provide the nucleus of the RAP. Overall our view is that effects of terrestrial vegetation will be minor.
- 11.79 The applicant has not provided sufficient information to enable an adequate understanding of groundwater flow paths, travel times and nutrient concentrations necessary for us to have confidence in the partition of groundwater catchments between the Wairepo and Quailburn, or that surface water bodies will not be adversely affected by the applicant's activities.

- 11.80 In particular our view is that the Wairepo Arm of Lake Ruataniwha is likely to become eutrophic during the summer because of the significant increase in nutrient loading caused by the applicant's activities. Similarly our view is that the applicant's activities would significantly contribute to increasing the trophic state of the Ahuriri arm of Lake Benmore and result in a change from its current oligotrophic state to a mesotrophic state.
- 11.81 Our view is that the lock-step approach proposed by the applicant is not appropriate to manage the potential changes in trophic state of these significant and valued water bodies because of the likely long travel times before any effect is manifest.
- 11.82 Uncertainties in groundwater flow paths also give rise to concern about possible nuisance periphyton growths in Serpentine Creek, Wairepo Creek, the Quailburn, and, to a lesser extent, the Ahuriri River.
- 11.83 The applicant has proposed significant and substantial nutrient mitigation measures; particularly cubicle barns and dual-function riparian margins. However in spite of these measures we cannot be confident that sustainable water quality outcomes will be achieved, which was the condition for Ngai Tahu to accept the granting of these consents.
- 11.84 The granting of these consents would result in significant economic benefits as well as positive environmental effects in terms of reducing/halting wind-borne soil erosion, and controlling invasive species over a large tract of land.

12 EVALUATION OF RELEVANT PLANNING INSTRUMENTS

- 12.1 Under s 104(1)(b) of the Act, we are required to have regard to the relevant provisions of a range of different planning instruments. Our Part A decision provides a broad assessment of those planning instruments and sets out the approach we have applied to identification and consideration of the relevant provisions. The following part of our decision should be read in combination with that Part A discussion.
- 12.2 In relation to the current application, we consider that the most relevant and helpful provisions are found in the regional plans, including in particular the WCWARP and the NRRP. In addition, the Proposed and Operative CRPS and the Waitaki District Plan are of assistance in relation to landscape issues that arise.
- 12.3 The following sections of this decision provide our evaluation of the key objectives and policies from these planning instruments. We have organised our discussion in accordance with the key issues arising for this application.

Water Quality

- 12.4 In relation to water quality the key documents we have considered are the WCWARP (incorporating the objectives of the PNNRP) and the operative NRRP provisions.
- 12.5 In relation to the WCWARP we consider that Objective 1 is the critical objective. In particular Objective 1(b) seeks to safeguard the life supporting capacity of rivers and lakes. We have determined that granting these consents is likely to result in the Wairepo Arm of Lake Ruataniwha becoming eutrophic in summer from its current mesotrophic state. In addition, we have serious concerns about the effect of the activities on the trophic state of the Ahuriri Arm of Lake Benmore and possible nuisance periphyton growths in Serpentine and Wairepo Creeks.
- 12.6 In relation to the effects on Lake Ruataniwha, going from mesotrophic to eutrophic is not simply a case of a slight worsening of a scientific index. We consider it has very real consequences in terms of the life supporting capacity of the ecosystem as tabled and discussed in Dr Coffey's evidence for MWRL. For example, a mesotrophic lake still has good biodiversity values whereas for a eutrophic lake they are compromised, there is some risk of toxic algae blooms under mesotrophic conditions whereas with eutrophic conditions, that risk becomes high, amenity and contact recreation values become poor when a lake is eutrophic and there is a high risk that macrophyte beds will collapse and the phytoplankton will dominate (the pea-soup effect). Therefore if the Wairepo Arm of Lake Ruataniwha goes from a mesotrophic to a eutrophic state, its life supporting capacity will be compromised, which is contrary to Objectives 1(a) and 1(b).
- 12.7 Similarly deterioration in the trophic state of the Ahuriri Arm of Benmore from oligotrophic to mesotrophic is a significant step along the continuum to eutrophy. Whilst not so important in terms of significance to life-supporting capacity, mesotrophic lakes are nevertheless increasingly

at risk from toxic algal blooms, whereas under oligotrophic conditions such risk is negligible. Allowing this to occur, along with the potential periphyton growth in Serpentine and Wairepo Creeks, is in our mind contrary to Objectives 1(a) and 1(b).

- 12.8 Objective 1(c) requires us to manage waterbodies in a way that that maintains natural landscape and amenity characteristics and qualities that people appreciate and enjoy. Given the concerns we have about the effects on water quality,, then we are of the clear view that we would not be (by granting consent) managing the waterbody in a way that maintains amenity characteristics and qualities that people appreciate and enjoy.
- 12.9 We note that Objectives 2, 3, 4 and 5 'in the round' deal with and provide for the allocation of water. However, the critical qualification is that water can be allocated provided that to do so it is consistent with Objective 1. Given the findings we have made about Objective 1, we must conclude that allocating water in terms of the balance objectives would not be consistent with the overall scheme of the WCWARP. We have reached this view taking into account the national and local costs and benefits (environmental, social, cultural and economic) of the proposal, as required by Objective 3.
- 12.10 Policy 13 links the WCWARP to the PNRRP (as it existed at the time) by requiring us to have regard to how the exercise of the consent could result in water quality objectives in the PNRRP not being achieved. As explained in our Part A decision, we have considered the objectives of the PNRRP and the now operative NRRP in relation to the current proposal.
- 12.11 Under the PNRRP (as incorporated into the WCWARP), Six Mile Creek, Serpentine Creek and Wairepo Creek were classified as 'Natural', meaning that the water quality and substrate had to be maintained in that state (i.e. No change). Policy WQL4 (non-point source discharge to surface water) requires that where all or part of a property is irrigated in the Upper Waitaki the annual average concentrations between the points where river enters and exits a property shall not rise by more than 0.01 mg/L soluble inorganic nitrogen and more than 0.001 mg/L soluble reactive phosphorus.
- 12.12 Dr Bright (for the applicant) was confident that the applicant's activities would not cause a breach of this classification provided the applicant kept within their NDA. We note Dr Ryder's opinion that these Creeks could not be considered 'natural' in any case. We also note the now operative NRRP has changed the classification to 'spring fed upland' which has slightly more permissive thresholds than the PNRRP allowed (Table WQL, NRRP).
- 12.13 Lake Ohau was classified as a High Country Lake in the both PNRRP and operative NRRP, which requires it to be maintained in a natural state if it is in that state. We do not see any difficulties in that respect from the applicant's activities.
- 12.14 The Wairepo Arm is unclassified in the PNRRP. However we note that in the operative NRRP it has been classified as an artificial lake. Under the PNRRP the annual average chlorophyll for an artificial lake should not be greater than 5 milligrams per m3 (Objective WQL1.2(3)(d)). The relevant criteria are that the maximum TLI is 4 (mesotrophic-eutrophic boundary) and ecological health indicators must be suitable for the purpose of the lake. For the reasons discussed above, we conclude that it is likely that granting this consent would result in the operative NRRP classification not being met.
- 12.15 The Ahuriri Arm of Lake Benmore is classified as an Artificial Lake under Table WQL6 of the NRRP, which has as an outcome the TLI shall not be greater than 3 (i.e. oligotrophic-mesotrophic boundary). As discussed in Part A and in Section x.y above we are of the view that granting these consents would result in a deterioration of lake water quality and cause that outcome to be breached. Therefore on both criteria (maximum TLI and intent of the water quality outcomes) Objective WQL1.2(2) of the NRRP would not be achieved.
- 12.16 For non-point source discharges to groundwater, Objective WQL2 of the PNRRP distinguishes between groundwater that is "*unaffected or largely unaffected by human activities*" (as reported in 2004). While there is extremely limited groundwater quality data in the Upper Waitaki there appears to be general agreement that nitrate nitrogen concentrations are generally low (<1 mg/l) and the WQS (#3.85d Part A) proposed a threshold of 1 mg/L nitrate-nitrogen for those catchments that sit below the threshold. We are comfortable with this interpretation and note that the applicant's proposal is compatible with this philosophy. However the applicant has proposed that 2 mg/L NO₃-nitrogen be the threshold above which a root cause analysis is carried out. Because of the importance of groundwater as a determinant of surface water quality, our view is that the 1 mg/L NO₃-nitrogen threshold is appropriate. We note the NRRP Objective WQL2.1(3) states that "Where groundwater enters a river of lake, the concentration of any

contaminant in the groundwater shall not result in the surface water quality being reduced below the relevant provisions of Objective WQL1, or the standards set by a water conservation order.” There has been insufficient data and analysis presented from which to predict maximum concentrations in groundwater and consequently whether the surface water threshold in WQL2.1(3) could be breached.

- 12.17 Overall then having regard to the scheme of the WCWARP and the NRRP we reach a conclusion that granting consent in this case would not be consistent with the key objectives and policies of both of these plans relating to water quality.

Environmental flow and level regimes

- 12.18 Policies 3 and 4 of the WCWARP refer to the setting of environmental flow and level regimes to achieve the objectives of the WCWARP. In addition, Policy 12 seeks to establish an allocation for each relevant activity within the catchment and requires consideration of the effects on other users. This is reflected in the rules of the PNRRP which specifies minimum flows and levels for water bodies and allocation limits for specific activities.
- 12.19 In terms of agricultural and horticultural activities it sets a limit of the annual volume of water that can be allocated above outlet of each of Lakes Tekapo, Pukaki, and Ohau. This application exceeds the limit for the annual volume of water that can be allocated above the Lake Ohau outlet. However we refer to our earlier findings on the effects on other users. MEL is the only affected party and has given derogation approval. We therefore conclude that the proposal is consistent with Policy 12 because the impacts on the exceedance of the allocation limit on the affected party MEL have been taken into account. In addition, the exceedance in terms of quantum is minimal.

Efficient use of water

- 12.20 Objective (4) of the WCWARP seeks to promote “*the achievement of a high level of efficiency in the use of allocated water*”. Policies 15-20 deal with efficient and effective use of water and are applicable to this application. In particular, Policy 16 requires us to consider whether the exercise of these consents would meet a reasonable use test in relation to both the instantaneous rate of abstraction and the annual volume for take, use, dam or divert.
- 12.21 Subparagraph (c) of Policy 16 states that annual volumes are to be based on either:
- (i) Soil-moisture measurement, local rainfall and evapo-transpiration modelling for the 1 in 5 year dry season (the year for which seasonal demand is exceeded in 20 percent of years); or
 - (a) The difference between peak total seasonal demand as shown in Table A1, Environment Canterbury Report U05/15 and the effective summer rainfall exceed 80 percent of the time from an approved rainfall site.
- 12.22 Efficient and reasonable use modelling in this case was done using the Irricalc model, which is not in accord with 16 ii (Table A1 U05/15 refers to WQN v2). Mr McIndoe’s evidence (Appendix D) stated that the Irricalc modelling meets all the requirements of Policy 16, including soil moisture measurements etc (16(i)). However in his rebuttal of Ms Penman (s42A Officer), he stated that neither WQ9 or Irricalc methods have been specifically calibrated against soil moisture measurements from the Mackenzie Basin because such data does not yet exist, and that it is unrealistic to compare Irricalc parameters against field measurements for specific farms before they are irrigated as the pasture would need to be irrigated in order to undertake the measurements.
- 12.23 We accept Mr McIndoe’s logic as a pragmatic way of resolving the issue if consents are granted, but we are of the view that the necessary measurements could have been made experimentally as part of the consent application process, and that strictly speaking the modelling carried out to date does not meet the requirements of Policy 16. It may have been possible to formulate consent conditions to address this issue. However given our overall conclusion on this application we have not considered this issue further.

Landscape and amenity

- 12.24 We discussed the relevant objectives and policies for landscape in our Part A Decision. In summary these are primarily found in the Proposed and Operative CRPS and the NRRP. In broad terms these provisions seek the protection of outstanding natural landscapes from inappropriate use and development.
- 12.25 In considering these provisions we are informed by the provisions of the Waitaki District Plan which identifies the applicant's property as a classified Rural Scenic Zone, however, it does have within it an Outstanding Landscape Area.
- 12.26 For the reasons already advanced we think with appropriate mitigation measures the landscape effects for this proposal are capable of being addressed by conditions and could achieve consistency with the relevant objectives and policies particularly those of the Proposed and Operative CRPS. However, given the findings we make on water quality which ultimately determines the outcome for this application we do not think it necessary for us to advance this matter any further.

Tangata Whenua

- 12.27 Objective 1(a) relates to the integrity of mauri and is closely linked to Objective 1(b). Mr Mikaere submitted that there are two aspects of mauri; the tangible and the intangible and that we could only properly deal with tangible. His view was that the tangibles are able to be addressed if mauri is considered as representing the health of the particular water body in question. If we accept this viewpoint then it follows that if we are not satisfied that the health of a particular water body is being safeguarded then the mauri is not being safeguarded either. As noted in above we do not have confidence that even with the very considerable mitigation measures proposed by the applicant, sustainable water quality outcomes will be achieved. It therefore follows that granting the consents may not maintain the integrity of the mauri.
- 12.28 NRRP, Chapter 5, Objective WQN1(c) and (d), seeks to enable present and future generations to access the regions surface water and groundwater resources to gain cultural, social, recreational, economic and other benefits, while (c) safeguarding their value for providing mahinga kai for Ngai Tahu and (d) protecting waahi tapu and other waahi taonga of value to Ngai Tahu.
- 12.29 This objective aligns with one of the principal aspirations expressed by Ngai Tahu during the hearing of enhancing mahinga kai resources and supporting ecosystems. The potential for an increase in algal blooms at important mahinga kai gathering sites such as the Ahuriri Delta would be a serious consequence for Ngai Tahu. We are of the view that the activity will result in nutrient loading in the Ahuriri Arm which would render this application to be inconsistent with the objective.
- 12.30 Policy 9 of the WCWARP seeks to discourage the further taking, use or diverting of water so that it mixes with the water of another catchment or sub-catchment, and provides guidance where waters from one catchment or sub-catchment may be mixed with another and how that might be mitigated. This policy recognises that there can be adverse cultural or ecological effects where cross mixing of waters occurs. It further recognises that the potential effects are generally likely to be greater where water of one catchment is mixed with another catchment.
- 12.31 The mixing of waters was an issue that concerned Ngai Tahu submitters, this application involves the taking of Lake Ohau water and applying that water to a large area of land, drainage water principally goes to groundwater. The partitioning of that drainage water as it travels to the Haldon or Ahuriri catchment occurs, the proportions are less certain. The water proposed to be taken from Lake Ohau currently augments a range of waters that flow into the Haldon Arm of Lake Benmore. The applicant's proposal will see an estimated 40% of the Ohau water applied to Glen Eyrie drain to the Ahuriri Arm of Lake Benmore.
- 12.32 From a cultural perspective the principal issue of water travelling via drainage through soils into groundwater on its way in this case to another sub-catchment would address the mixing of waters issue. The Lake Ohau water travelling toward the Ahuriri Arm rejoins at the lower end of Lake Benmore, having been passed through land on the way. The principal issue of mixing of waters is in this case we believe has a less than minor effect on the cultural values of Ngai Tahu and is therefore not inconsistent with Policy 9.

Wetlands

- 12.33 Chapter 7 of the NRRP deals with wetlands and we think that objective WTL1(c) and is relevant to this application. Objective WTL1 provides that Canterbury wetlands are managed in a way that enable people and communities to provide for their social, economic and cultural wellbeing whilst meeting a number of constraints. Constraint (c) is there be no overall reduction in the contributions wetlands make to outstanding natural landscapes or as a natural outstanding feature.
- 12.34 In addition to sub paragraph 2(a) of WTL1 seeks that the quality and quantity of wetlands is enhanced where possible, particularly in areas where wetlands are most depleted and as a minimum that there is no reduction in cultural, heritage and recreational values of wetlands or the maintenance and enhancement of their amenity value, or their value as significant habitats of trout and salmon, and no overall reduction in the role that wetland's eco-systems play in water capture, ground water, recharge, water storage, flow attenuation and maintaining water quality.
- 12.35 Chapter 7, Objective WTL1(d) seeks to achieve no overall reduction in the contribution wetlands to the relationship of Ngai Tahu and their culture and traditions with their ancestral lands, water, mahinga kai sites, waahi tapu and waahi taonga.
- 12.36 We think that if the mitigation measures proposed by Dr Bartlett in relation to buffers from waterways and wetlands were implemented and maintained as she suggests, then a grant of a consent would in all likelihood be consistent with the above described provisions. However because of our overall conclusions, we do not need to make a definitive finding on this issue.

Key conclusions on objectives and policies

- 12.37 For all of the above reasons, we consider that granting the consent would be contrary to the objectives and policies of the WCWARP (incorporating the PNRRP) and the NRRP relating to water quality. As consequence of this is that the proposal would also be contrary to the objectives and policies relating to tanagta whenua values. In terms of landscape issues, if the mitigation measures recommended by Mr Glasson were included then we think that a grant of consent would be consistent with both the Operative and Proposed CRPS.

13 EVALUATION OF OTHER RELEVANT S104 MATTERS

- 13.1 Under s104(1)(c), we are required to have regard to any other matter that we consider to be relevant and reasonably necessary to determine the application.

Precedent or plan integrity effect

- 13.2 Ms Penman raised a concern that granting this consent over the allocation limit may have a precedent or plan integrity effect as the WCWARP is an operative plan. This was contested by Mr Whata on the basis that Ms Penman's concerns misconceived the reasons for the allocation limits. We do not think that this proposal raises either a precedent or plan integrity effect because MEL has given its derogation approval to the proposal.

Inadequate information

- 13.3 Under s104(6) RMA we may decline application for resource consent on the grounds that it has inadequate information to determine the application. However before doing so, we must have regard to whether any request made of the applicant for further information or reports resulted in further information or any report being available.
- 13.4 Any effects on receiving waters (creeks, rivers, lakes) will be manifest by the ingress of groundwater to the receiving water in question. However the applicant has not presented even the most basic data on groundwater within Glen Eyrie Downs to validate the WQS model at the scale needed to determine the groundwater catchment divide (Wairepo:Quailburn), recharge/discharge relationships with streams and rivers, and quality of the existing groundwater. We note the applicant proposes to address these uncertainties through their lock-step approach; where the information is gathered, audited, and conclusions made and agreed prior to exercising the consent. We summarise our views on the lock-step approach in Section 11.

14 SECTION 104D JURISDICTIONAL HURDLES

14.1 Based on our evaluation under section 104, we now move to consider whether either of the jurisdictional hurdles under section 104D of the RMA can be met.

Would the adverse effects be minor?

14.2 As discussed earlier we are of the view that the applicant's proposed activities may, even with the mitigation measures proposed, cause more than minor adverse effects. In summary these effects are:

- (a) Contribute to a change in the trophic state of the Wairepo Arm of Lake Ruataniwha from a mesotrophic to a eutrophic state during summer;
- (b) Contribute to nuisance periphyton growths in Serpentine and Wairepo Creeks and the Quailburn, and possibly the Ahuriri River above MfE guideline values. We note that this is dependent upon groundwater pathways about which there is insufficient information to have any certainty; and
- (c) Contribute to a change in trophic state of the Ahuriri Arm of Lake Benmore from an oligotrophic state to a mesotrophic state during summer

14.3 All of the above fit within the definition of effects (Section 3 RMA) particularly 3(d)-(f) as follows:

"(d) any cumulative effect which arises over time or in combination with other effects—regardless of the scale, intensity, duration, or frequency of the effect, and also includes—

(e) any potential effect of high probability; and

(f) any potential effect of low probability which has a high potential impact"

14.4 Overall, we are not satisfied that the adverse effects of the proposal will be minor and the first jurisdictional hurdle has not been met.

Would the activity be contrary to the objectives and policies?

14.5 The relevant plan under which consent is required is the WCWARP. We have provided an evaluation of the relevant objectives and policies of that plan (including the relevant provisions of the PNRRP incorporated by reference) within this decision.

14.6 In summary, we consider that granting this consent would be contrary to Objective 1 of the WCWARP (being the core objective of the plan) because doing so would:

- (a) Fail to safeguard the life-supporting capacities of waterbodies; particularly the Wairepo Arm of Lake Ruataniwha, which in our view would be at risk to becoming eutrophic;
- (b) Fail to preserve the mauri of waterbodies, particularly the Ahuriri Arm of Lake Benmore, the delta of which is of special significance to Ngai Tahu as a source of mahinga kai; and,
- (c) Fail to manage the water bodies (by utilising them to irrigate pasture) in a way that maintains natural landscape and amenity characteristics and qualities that people appreciate and enjoy. We came to this conclusion because of the particularly high landscape values and utilisation associated with this landscape unit.

Conclusion

14.7 We have determined that neither one of the jurisdictional hurdles are satisfied in this instance because we consider:

- (a) The applicants proposed activities, in combination with other irrigation consents already granted, will have a more than minor effect on receiving waters; particularly the Wairepo Arm of Lake Ruataniwha and the Ahuriri Arm of Lake Benmore. It would also cause adverse effects on landscape.

- (b) Granting the consent would be contrary to Objective 1 of the WCWARP and may result in the water quality objectives of the PNRRP not being met (Policy 13 of the WCWARP).
- 14.8 As neither of the jurisdictional thresholds is satisfied, we do not have the ability to grant consent. Nonetheless, for completeness we discuss Part 2 matters below before providing our overall evaluation

15 PART 2 RMA

- 15.1 Section 104(1) states that the matters which we have discussed above are subject to Part 2, which covers section 5 through section 8 inclusive. These sections are set out in full in our Part A decision and are discussed below in the context of the current application.

Section 6 – Matters of National Importance

- 15.2 Section 6 identifies matters of national importance that we must “recognise and provide for” when making our decision, including preserving the natural character of lakes and rivers (s6(a)), protecting outstanding natural features and landscapes (s6(b)) and the relationship of Maori with the environment (s6(e)).
- 15.3 In relation to s6(a), we consider that the natural character of Lake Benmore may be compromised if we grant this consent. While it is unlikely that a shift from oligotrophic to mesotrophic conditions will be readily seen by the public as a deterioration in natural character, for those knowledgeable about lake quality and fisheries it will be perceived that way because it will place Lake Benmore firmly on the continuum of increasing trophic waterbodies that are very difficult to reverse. We are also cognisant that Lake Benmore is not a natural waterbody, but is nevertheless nationally significant because of its importance for power generation and supporting the best lake fishery in the South Island. Accordingly, we do not think a grant of consent would recognise and provide for section 6(a) RMA matters.
- 15.4 In regards to s6(b), with the mitigation measures proposed by Mr Glasson we consider that granting these consents would be consistent with this provision..
- 15.5 Finally the traditional and cultural significance of the Ahuriri Delta to Ngai Tahu and in particular their efforts to promote restoration of mahinga kai in that area, lead us to conclude that granting these consents would be contrary to 6(e).
- 15.6 For the above reasons, we consider that granting consent to the proposal would not recognise and provide for sections 6(a) and 6(e), as we are required to do under the RMA.

Section 7 – Other Matters

- 15.7 Section 7 lists other matters that we shall “have particular regard to”. We make the following observations in relation to each of these matters as they are relevant to the application, referring to the sub paragraph numbers of s7:
- (a) The principle of Kaitiakitanga has been observed to the extent that the applicant has endeavoured to consult with and understand the tangata whenua (Ngai Tahu) values that might be subjected to impacts from the proposed Glen Eyrie irrigation development. The applicant has gone on to develop a Farm Environmental Management Plan and a nutrient mitigation process that they consider will address the kaitiaki interests of Ngai Tahu. We note however that Ngai Tahu remain concerned at the end of the hearing with the scale and consequently the potential cumulative impacts the proposed development might have on downstream waterways and mahinga kai values.
- (aa) The ethic of stewardship has been followed with respect to land management of the applicant’s property. The applicant has submitted that an irrigated farm system is the only way to arrest the very considerable problem of wind-borne soil erosion and control invasive species such as wilding pine and hieracium. We agree with that assessment. On the other hand, however, we have determined the loss of nutrients offsite is likely to cause adverse effects on waterways, even with the significant mitigation measures proposed, which is not consistent with stewardship. This is brought about because of the position of the applicant’s property in the landscape, relative to waterbodies valued by the community.

- (b) The applicant has not demonstrated their proposal constitutes an efficient use of water. However, we acknowledge that this is a technicality that can be resolved. The proposal constitutes an efficient use of energy with the only pumping required being that to get water from Lake Ohau to the top of the lake terrace.
- (c) We think the effects on recreation and amenity values, particularly those arising from water quality outcomes from a grant of this proposal, will be significant.
- (d) The intrinsic value of terrestrial ecosystems will be affected with existing vegetation replaced by pasture. However the existing value of terrestrial ecosystems within the irrigation command area is low and there is little prospect of its restoration under existing permitted land use. Stream ecosystems within the property boundary will be enhanced through dual function riparian margins which should improve stream habitat. However this may be offset by deterioration of creeks and river downstream should relatively nutrient-enriched groundwater intersect them, and the trophic state of Wairepo Arm of Lake Ruataniwha and the Ahuriri Arm of Lake Benmore will deteriorate.
- (e) The overall quality of the environment downstream of the applicant's property will in our view be degraded, and although the degree of that degradation cannot be predicted with confidence, there are significant consequences should Wairepo Arm become eutrophic or Ahuriri Arm, mesotrophic.
- (f) While it may be argued that Wairepo Arm of Lake Ruataniwha is of low value relative to other large high country lakes in the region, it is nevertheless a well-used resource of some significance in the District. The Ahuriri Arm valued highly by Ngai Tahu, fishermen, tourists, and the local population. The WCWARP and NRRP recognise the finite nature of water resources in the Mackenzie Basin and seek to ensure that they are maintained or enhanced and certainly not degraded.
- (h) Fish & Game have not raised any issues with respect to trout in salmon in water bodies downstream of the applicant's property. However should nuisance growths occur in Wairepo Creek or Wairepo Arm becomes eutrophic then trout and salmon habitat will be compromised to some extent. This, we think, results in the outcome sought by Section 7(h) RMA not being met.

15.8 Having particular regard to the above matters in the context of section 7, we conclude that the grant of consent could not be supported

Section 8 – Treaty of Waitangi

- 15.9 Finally, section 8 requires that we shall take into account the principles of the Treaty of Waitangi (Te Tiriti o Waitangi).
- 15.10 Section 8 of the RMA has had a cascading influence on the development of regional and district plans in so far as they affect the Upper Waitaki through the integration of Ngai Tahu values into the respective objectives and policies. The applicants were part of the initiative (MWRL) to develop a Cultural Impact Assessment and the subsequent engagement of a cultural expert (Mr Buddy Mikaere) to assist the individual applicants such as Ohau Downs to relate the findings of the CIA to their property. Southdown Holdings Ltd made an effort to consult with Ngai Tahu interests to clarify and mitigate identified cultural issues, this included on site visits by Ngai Tahu. While the applicant has developed significant mitigation measures to reduce or remove the negative impacts of the proposed activity, we note that the scale of the proposed development has made it difficult for Ngai Tahu to be confident that the cumulative effects are no more than minor. Their position at the close of the hearing was that they remained opposed to this application unless we (the Commissioners) were assured that in granting this consent (with conditions) effects on water quality would be no more than minor. We cannot give that assurance.

Section 5 – Purpose of the RMA

- 15.11 Turning now to the overall purpose of the RMA, that is, "*to promote the sustainable management of natural and physical resources*".
- 15.12 We consider that taking all issues into account, the take and use of water from Lake Ohau for spray irrigation of 2,068 ha of crops and pasture is not consistent with the purpose of sustainable management. Although it will make positive economic contribution to the overall regional

(Waitaki) wellbeing and will have the positive environmental effect of reducing soil erosion and managing terrestrial invasive species, the life supporting capacity of aquatic ecosystems will not be safeguarded.

- 15.13 In our view, the scale of the proposal is such that, adverse effects on the quality of downstream ecosystems are likely to occur.
- 15.14 This leaves section 5(2)(c) RMA and the obligation to avoid, remedy or mitigate any adverse effects of activities on the environment.
- 15.15 The applicant has proposed significant and substantial mitigation measures to mitigate nutrients generated by its activities. These include the use of cubicle stables to house dairy cows for much of the year, which will largely eliminate urine spotting, and result in an even distribution of dung and urine across the irrigation command area. We are reasonably confident that the reduction in nutrients predicted from this change in management practice over conventional dairying systems will be achieved. However despite that mitigation, our view is that the scale of the proposal is such that remaining nutrient leaving the property will be of sufficient magnitude such that, adverse environmental effects will ensue.
- 15.16 The applicant has also proposed four other farming systems from the irrigated pasture, being cut and carry (no animals) a mixed farm, sheep and beef, and conventional dairy with effluent being removed from the catchment. For each of these systems (as well as the cubicle dairy system) the applicant proposes dual function riparian margins along watercourses within the property. The applicant has made it clear that the cubicle dairying system is the favoured option, but the other systems remain as options. Indeed Mr Whata invited us to nominate which system(s) would be acceptable. We decline to do so because apart from the cut and carry system, predicted nutrient losses from the other systems are very similar (well within error of the modelling). Apart from cubicle dairying and the proposal to export the effluent from the property (about which we have insufficient detail) there are no other mitigation options tabled that will prevent significant nutrient from being lost from the property and entering aquatic ecosystems. The problem is not so much the mitigation proposed, but the overall scale of the proposal leading to significant nutrient losses (albeit at relatively low rates/unit area compared with other systems).
- 15.17 The applicant has proposed a lock-step approach as a means of ensuring that the uncertainties discussed during the hearing are addressed prior to full exercise of the consent. However for the reasons discussed in Section 11 we do not consider that to be appropriate.

16 OVERALL EVALUATION

- 16.1 If the application had passed through either of the jurisdictional hurdles in s104D, then we would have had a discretion to exercise. This requires an overall judgment to achieve the purpose of the Act and is arrived at by:
- (a) Taking into account all the relevant matters identified under s 104;
 - (b) Avoiding consideration of any irrelevant matters;
 - (c) Giving different weight to the matters identified under s104 — depending on the Court’s opinion as to how they are affected by the application of s 5(2)(a), (b), and (c) and ss6-8 — to the particular facts of the case; and then in light of the above; and
 - (d) Allowing for comparison of conflicting considerations, the scale or degree of conflict, and their relative significance or proportion in the final outcome.
- 16.2 As it is, for the reasons outlined above, we have concluded that neither of the jurisdictional hurdles have been met. As such we do not have the discretion to grant consent. Nonetheless, for the sake of completeness the following part of the decision provides our overall evaluation of the proposal.
- 16.3 We consider that the key conflicting considerations in this case are that there will be:
- (a) considerable economic benefits to the wider district, positive environmental outcomes in terms of controlling wind-borne soil erosion and invasive weed species; but
 - (b) adverse environmental effects on the Wairepo Arm of Lake Ruataniwha, the Ahuriri Arm of Lake Benmore, and possibly (depending on groundwater pathways) the Wairepo Creek

downstream of the applicants property, Serpentine Creek, the Quailburn and Ahuriri River; and

(c) Significant adverse effects on Tangata Whenua values.

16.4 We have considered the scale or degree of conflict and note that major focus of this hearing is the preservation of water quality of streams, rivers and lakes in the Upper Waitaki catchment. We therefore consider that because of our finding that the Wairepo Arm is likely to come eutrophic if this consent was granted and exercised, and the Ahuriri Arm of Lake Benmore likely to increase in trophic state from oligotrophic to mesotrophic (in conjunction with granting other applications before us at this hearing) this has to be our overriding consideration. We note that the total lack of data supporting the modelling of groundwater played a significant role in coming to our conclusion as did the position of applicant's property in relation to the Wairepo Arm, The Ahuriri Arm and other consented irrigated areas. The potential adverse effects are significant, which meant that we took a conservative approach in coming to our decision, which we consider to be justified approach given the long-term consequences of granting the consent, and the potential effects being realised.

16.5 Having reviewed the application documents, all the submissions, taking into account the evidence to the hearing and taking into account all relevant provisions of the RMA and other relevant statutory instruments we have concluded that even if we did have a discretion to exercise, the outcome which best achieves the purpose of the Act is to decline consent.

17 DECISION

17.1 Pursuant to the powers delegated to us by the Canterbury Regional Council:

17.2 For all of the above reasons and pursuant to sections 104, 104B and 104D of the Resource Management Act 1991, we **DECLINE** application CRC040835 by Southdown Holdings Limited.

DECISION DATED AT CHRISTCHURCH THIS 22ND DAY OF NOVEMBER 2011

Signed by:

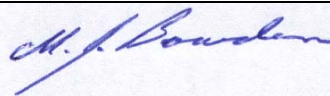
Paul Rogers



Dr James Cooke



Michael Bowden



Edward Ellison